McGRAW-HILL DIGEST

AMONG 170 ITEMS IN THIS ISSUE ARE:

SPECIAL FEATURES

What Atomic Power Will Cost 1
Production Up, Costs Down.. 2
Phasitron—New F-M Radio. 3
What's New in Aircraft.... 6
Improvising in Construction.11
Related Selling Pays.....14
Technical Shorts 16
Technical Food Findings....18
Chemistry Moves Ahead...23
New Products 24
Pitfalls of Profit Sharing....28
Fast Fire Control.....31

AVIATION

Radar Lands Carrier Craft...10
Smooths Airport Operation..20
Noiseless Aircraft 21
Also: 6, 16, 17, 22, 27, 29, 30

CHEMISTRY

Guayule Separation 10
Automatic Spectograph 21
Spray Packaging 33
Also: 7, 8, 14, 17, 23, 26, 27

CONSTRUCTION

Grid Roller 2
Sewer Technique 7
Basin Dredged in Service....13
Also: 4, 5, 8, 9, 11, 16, 20, 25

ELECTRICITY, POWER

Static Detears Paint..... 1
Chemical Scale Removal..... 8
Linear Electric Motor.....29
Also: 1, 10, 12, 13, 15, 17, 20, 24

ELECTRONICS, RADIO

Mathematical Music 7
Radar Forecasts Weather....33
No-Static Diathermy 34
Also: 3, 13, 16, 22, 24, 28, 31, 32

FACTORY METHODS

Scrap Tickets Avoid Delay... 4
Easily Moved Presses..... 9
Ford Efficiency 12
Also: 2, 27, 28, 30, 31, 34

FOOD PROCESSING

Milk Plant Architecture..... 8
Popcorn Bread 15
New Levulose Process 30
Also: 5, 13, 16, 18, 23, 24, 25, 26

MECHANICAL DESIGN

New Tool Design..... 5
Hydrotorque Drive 19
Why Ships Break in Two....33
Also: 6, 15, 17, 20, 24, 29, 30, 34

METALWORKING

In-Water Induction Heater...19
Welded Steel Houses.....22
Flash Welding Pays Way....29
Also: 1, 12, 16, 24, 25, 27, 31

MINING

What Mine Bosses Want..... 9
Plastic Oil-Well Patch.....23
Diamond Drilling Improved..32
Also: 16, 19, 23, 24, 26, 28

TEXTILES

Resin Controls Shrink.....12
New Synthetic Fibers.....21
Useful Textile Chemicals.....30
Also: 15, 16, 20, 25, 26, 27

TRANSPORTATION

Foils Punctures 8
Rail Giant 20
Tells Where Trains Are.....32
New Bus Equipment.....34
Also: 6, 15, 22, 24, 25, 26, 27

Banking for Foreign Trade

BANKERS TRUST COMPANY

NEW YORK

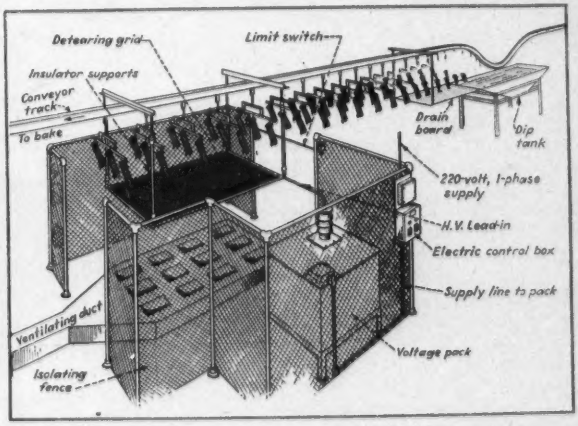
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

What Atomic Power Will Cost

Expense of a 75,000-kw. plant put at $25,000,000. Operating cost seen as 8 mills per kwh. Several advantages listed

First official estimates of the cost of atomic electric power plants for installation in the near future have been presented in a report to the United Nations. Drawn up by scientists and engineers with Clinton Laboratories and Monsanto Chemical Co., which operates the Laboratories, the report asserts that a 75,000-kw. plant can be built for about $25,000,000 in a normal locality in the eastern United States. Assuming operation at 100% load factor and 3% interest, operating costs will be 8 mills per kwh. This compares with a $10,000,000 coal power plant operating at 6.5 mills per kwh., with coal delivered at $7 a ton. Equality of operating costs between coal and nuclear power plants would be reached if the coal cost $10 a ton. But atomic-electric costs may be expected to decline with continued research and development, while coal and oil costs have increased greatly and show signs of going higher.

Nuclear power plants, in contrast with hydroelectric plants, have the advantage of being able to supply process and heating steam directly, in addition to power. Because nuclear plants lend themselves to decentralization, more economical industrial combinations should develop. Further, the nuclear power plant might aid industrial progress in isolated regions where the cost of oil, gas, or coal is prohibitive and where a suitable supply of water is unavailable; such a plant, combined with the gas turbine, would require no cooling water. The atomic power plant also may be desirable as a standby for large



STATIC DETEARS PAINT—Strong attraction between a negatively charged grid and positive workpiece, produced by electrostatic field, causes excess paint to spurt from drain-off points of dipped articles in minute streams (left). Time for detearing most parts is 15 to 60 sec. Typical production line (right) includes a dip tank, an overhead conveyor, a negative grid, voltage pack, electrical controls, and ventilating ducts. Limit switch cuts off power if parts are hung so as to be nearer than 8 in. from grid. Electrostatic force is supplied by a direct field pulsating from 0 to maximum 60 times a sec. Average current through field, 0.4 milliamp.; power, about 1,000 watts. —AMERICAN MACHINIST

utilities. It is the belief of many scientists and engineers connected with the atomic project that a comparatively small standardized nuclear power plant will be developed.

Several types of atomic plant have been considered, but the preceding cost comparisons are based upon a modified Hanford-type pile which would operate at a temperature high enough to supply power and from which all the plutonium would be recovered. —ELECTRICAL WORLD

Production Up, Costs Down

Methods by which U. S. manufacturers have improved efficiency, minimized delays, made the job easier and safer, and curtailed expense

In the same work space, at lower cost, and with higher quality, Apex washing machine production has been increased 25% over prewar by a new production-line layout using slat, belt, and trolley conveyors to speed assembly. Output is 1,250 a day, with 1,500 in sight.

By insulating three 90,000-gal. outdoor hot-asphalt storage tanks with 1½ in. of 85% magnesia blocks, Flintkote saved $4,648.97 in a year in the cost of fuel required to keep the asphalt hot. Steam consumption is down 25% and the temperature at which asphalt can be held has been raised from 230 to 300° F.

An overhead chain conveyor which moves steel inserts for plastic steering wheels through the production line at a General Motors plant has a capacity slightly more than twice the hourly production rate. Consequently an hour's production is stored on the conveyors to counterbalance production variations along the line. Temporary repairs and changing of dies on the molding presses do not affect the flow of materials.

Chances of smashing fingers were reduced and efficiency in crating rolls of linoleum increased at Armstrong Cork by a tilt-table. Rolls weighing up to 500 lb. are now brought in by hand truck and tipped onto tilting platform at end of table. Pivoting the platform brings rolls to table built with slope that causes roll to practically pack itself in an on-side crate at far end. As roll enters crate, it tips platform to bring crate into upright position for easy nailing, wire-binding.

Cards for jobs assigned to operators in a department at National Cash Register are placed in a vertical revolving rack. About an hour before an operator is finished with his current job, he checks the rack. If he finds that no job has been assigned to him, he attaches a blue metal check to the hook beside his name, indicating to foreman that he is in early need of a new job. If, on checking a new assignment, he discovers that the job is one that has no price tag assigned, he attaches a red metal check to the hook. This tells the time-study man that he must give the new job a trial run when it is set up and assign a price. The job rack correlates activities. —FACTORY

GRID ROLLER—Serving a need between a sheepsfoot and a flat-wheel roller, this roller has a grid of ¾-in. bars and openings 1 in. square. It produces a densely compacted subsurface layer, and a pebbled-texture surface which bonds well with any superimposed soil or base course layer. To prevent clogging of the open spaces, spiked wheels ride each roller. This machine pushes stones beneath the surface, eliminating hand-picking. —CONSTRUCTION METHODS

Phasitron—New F-M Radio

Novel method of generating frequency-modulated carriers uses new type of tube, effects economies in broadcast transmitter design

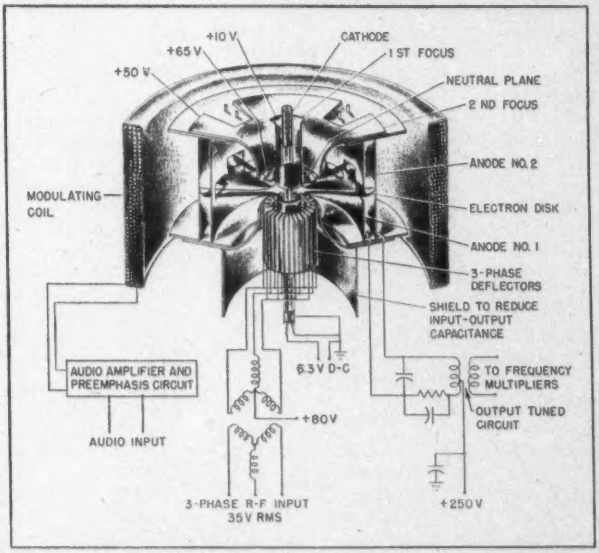
Economies in commercial frequency-modulated broadcast transmitter design are made possible by a new Phasitron modulation scheme developed by a Zenith Radio engineer. After amplification, the 230-kc. carrier frequency is used to drive a phase-splitting network to provide 3-phase voltages for the input deflector grids of a Phasitron tube (diagram). Anodes 1 and 2 of the tube are at positive dc. potential and draw electrons from the cathode radially in the form of a tapered thin-edge "disk," as dictated by the 1st and 2nd focusing electrodes.

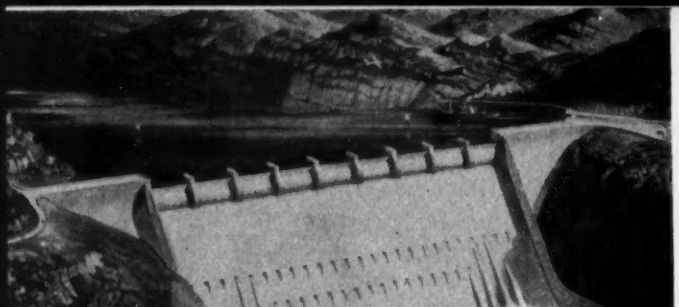
This disk passes between a neutral plane and a 3-phase deflector grid assembly consisting of 36 wires with every 3rd wire connected together to form 3 groups of 12. The 3-phase voltages are applied to these deflectors, which, in turn, provide a rotating electrostatic field between the deflectors and the neutral plane, and warp the electron wheel into a ruffled disk. The sinusoidal ruffle falls upon anode 1, which is perforated in a half-cycle arrangement to match the edge of the disk. As the disk rotates, the sinusoidal edge successively passes through the perforations or is collected by the metallic barriers separating them. A push-pull tuned circuit placed between these anodes is driven by the alternate collection of electrons by the 2 anodes, and supplies voltages at the crystal frequency for driving doublers and triplers to raise the frequency to that of the radiated carrier.

The second focus electrode, in addition to having an electrostatic influence upon the beam, is made of magnetic material and acts as a magnetic concentrator to confine the flux produced by the audio modulating coil to a narrow region at the edge of the deflector grid.

The action of this magnetic field is to bend the electron stream, advancing or retarding the phase of the sinusoidal ruffled edge with respect to the perforated anode, and causing a phase shift in the tuned circuit. —ELECTRONICS

Vertical section of new Phasitron tube and modulator coil. Connection to a typical transmitter circuit is indicated.





WALL OF MODERN CHINA—Key feature of the world's largest hydro-electric power project, planned by China with aid of U. S. Bureau of Reclamation, and kinspin of flood control, navigation, irrigation and power development, will be the Yangtze Gorge Dam 300 miles east of Chungking. This 750-ft. high dam will be the biggest ever built anywhere and will impound 50,000,000 acre-feet of water to irrigate 10,000,000 acres. The power of 96 Coulee-type 108,000-kw. turbine generators will be used to develop industry. —POWER

PANAMA CANAL DIESELS OPERATE AUTOMATICALLY

Seven 3,550-hp. diesels which drive generators to supply emergency power for the third set of locks at the Panama Canal are arranged to start automatically, as are the frequency chargers. A remote-control switch initiates the automatic start by picking up a master relay. This relay checks the condition of all important parts of the engine through temperature and pressure switches and other devices. If conditions are normal, the relay starts the 90-gpm. lubricating-oil priming pump and builds pressure up to 6 psi., which closes a switch in a circuit that indicates the engine is ready to start. The master relay also energizes a solenoid valve to admit air behind a piston which moves the fuel-control shaft to operating position. The engine starts turning over when the solenoid valve in the starting air line is energized as the oil pressure is built up, and the starting process is the same as manual starting.

After the engine has reached 230 rpm., a speed-switch shuts off the starting air and an air-pressure switch stops the lubricating-oil priming pump. Then the governor takes control, and the engine operates normally, but temperature-actuated relays stop it if it gets too hot.

The engine is shut down by closing a solenoid valve which releases air pressure on the piston operating the fuel-shaft, permitting a spring to move the shaft to no-fuel position. —POWER

SCRAP TICKET PREVENTS PRODUCTION DELAYS

How to prevent shortages of subassemblies and parts at final assembly of toy trains was a problem at Lionel Corp. A form which is made out when defective parts are scrapped not only solved the problem but improved quality and reduced overall-cost.

This "scrap ticket" is made up in padded sets of 5 differently colored 4x6-in. sheets interleaved with carbon paper. The white copy goes to the production department, the green to the superintendent, the pink to the cost department, the blue to the inspection department, the yellow to the scrap-control department. The production department checks the parts inventory to see if the loss is within the shrinkage allowance (1 to 5%). If it is not, a supplementary order for replacement of parts is issued immediately. The superintendent and the cost, inspection, and scrap-control departments use their copies in rejection, cost, and quality control. —FACTORY

BULK PAPER CARTON FOR SEMI-LIQUID PRODUCT

Unable to get 50-lb.-capacity metal cans for packing shortening, some firms have developed a suitable container made from kraft paper with straw corrugations and a sleeve inside for support. A greaseproof inner bag of 1 thickness of 70-lb. parchment glued at the seams is used to hold the semi-fluid product. A coating of plasticizing agent is given to the inner bag, to prevent it's tearing or cracking as it is opened by a foot-operated bag former. By the time the container reaches the filling line, glue has dried and sealed the lining bag to the container. In some cases wooden hoops are used to hold the liner in open position while filling. —FOOD INDUSTRIES

NEW MACHINE TOOL DESIGN FORCED BY CARBIDES

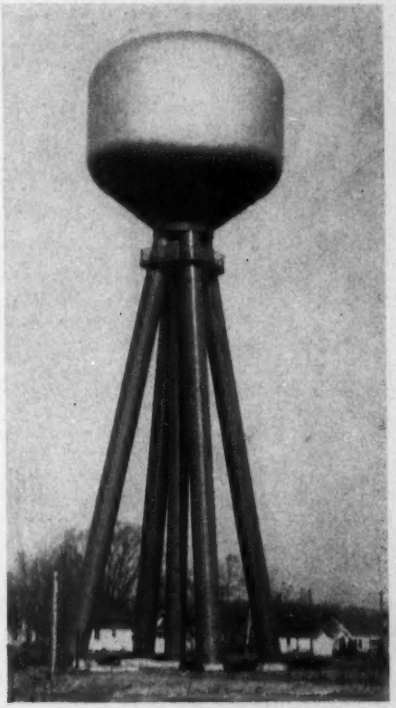
Having substantially increased the unit production rate of machine tools, cemented carbides now require far-reaching changes in the design of these tools to make them more powerful and rugged. And the high capacity of the new machines will necessitate changes in shop layout and in methods of handling the added flow of material and chips per machine.

In metalworking, the carbides offer such advantages as:

1. Reduction of machining time through increased cutting speed (300 to 1,000%).
2. Less tool-sharpening and changing time and lower tool-grinding costs.
3. Reduction in the use of tungsten and such quality-improving elements because of their increased effectiveness (8 to 10 times that in high-speed steel) in cemented carbides.
4. Increased shop output per machine.
5. Lower power consumption for removal of a given amount of metal.

If cemented carbides are to be used effectively, 8½ to 10 hp. should be available, even for such a small chip cross-section as 0.0016 sq. in. When removing such a chip with high-speed steel at 65 fpm., about 1.36 hp. is required, and 7.5 hp. is needed for the same chip at 400 fpm. with cemented carbides

Cemented carbides may be used on old machines, disregarding their life expectancy—in the average shop it should be possible to apply them to 60 to 70% of the lathes and turrets If old machines are fitted with a gearbox and a more powerful motor they can efficiently handle half-roughing cuts. But new machines are notable for strong construction of saddle, rest, and tailstock and compactness and strength of bed and bed box. —AMERICAN MACHINIST



ATTRACTIVE WATER-TANK—Supported on 4 steel tubular columns of 54-in. dia., with a 48-in. central riser, this water tank in Indiana has 250,000-gal. capacity, needs no further rods or struts for wind-resistance. Another tank with 3 supports has been built. —ENGRG. NEWS-RECORD

The new Lockheed "Constitution" is the largest land transport.

What's New in Aircraft

400-mph. airliners under construction. High-performance, low-cost light planes developed. Largest transport designed to use gas turbines

Preliminary work is under way by Republic Aviation Corp. on a fleet of thirty-eight 400-mph., 40-passenger *Rainbow* airliners. Designed to cruise at an altitude of at least 30,000 ft. on 4,000-mi. nonstop runs, the pressure-cabin aircraft is powered by four 3,250-hp. Pratt & Whitney Wasp Major engines, has a 129-ft. wingspan. Overall length is 98¾ ft.; maximum fuselage dia., 10¼ ft.; fuel capacity, 5,570 gal. The streamlined, transparent, bullet-like nose, so essential to the plane's highspeed performance, can be retracted, exposing a sharp-angled windshield which allows safer and better visibility for the pilot in near-ground and heavy-weather flying. The noiseproof cabin, luxuriously furnished, has bar, telephone, motion picture, and dining accessories and will carry 10,000 lb. —AIR TRANSPORT

Designed for low-cost mass production and easy maintenance, a new 85-hp., 2-place, tandem, personal airplane soon to be flight-tested by Aero-Flight Corp., is expected to fly 175 mph., land at low speed, range 700 miles and have a service ceiling of 16,500 ft. The plane is of all-metal, semi-monocoque, low-wing construction, with cantilever wings and tail surfaces. Landing gear is retractable. Continental C-85-12J engine has fuel injector . . . Now being built by Baumann, the *Brigadier* 250 is a light, 4-5 place, executive transport with two 125-hp. Continental engines forward of main wing beam and driving pusher propellers through a 4-ft. chrome-molybdenum shaft. Designed top speed is 170 mph.; cruising speed, 150 mph.; landing speed, 60 mph.; gross weight, 3,200 lb.; climb, 1,250 fpm.; ceiling, 18,000 ft.; range, 600 miles; cost, under $10,000. —AVIATION

Predicting a rapidly expanding market for light planes in Brazil, Companhia Aeronautic Paulista has developed two 150-hp. 4-place ships for farmers and ranchers. A 3-place, 125-hp. model, expected to sell at $4,500, and a 2-place 65-hp. plane also have been introduced by the company . . . Lockheed's *Little Dipper*, lightplane prototype, reportedly lands at about 20 mph., yet cruises at 100 mph . . . Believed to be the lowest price for an airplane now in production, $1,995 will buy the 2-place Taylorcraft *Ace*. The 65-hp. plane cruises at 100 mph., uses 4 gal. of fuel per hr., has a

range of 270 miles, a 15,000-ft. ceiling, takes off in 350 ft., lands at 38 mph.

Lockheed's new *Constitution* not only is the largest land transport, but it heralds the transition to gas-turbine power in large transports. Built for the Navy, this 184,000-lb. ship with 189-ft. span and 156-ft. length is designed to use gas-turbine engines as soon as available—at present it has 4 radial engines totaling more than 12,000 hp. Despite its huge size, the *Constitution* will take off in 2,350 ft., land over a 50-ft. obstacle in 2,300 ft., range 6,000 miles, fly 300 mph. Engines, landing gear and brake and wheel mechanisms are accessible for in-flight maintenance. Two sets of dual wheels in tandem on each side provide a safety factor in landings. —AVIATION NEWS

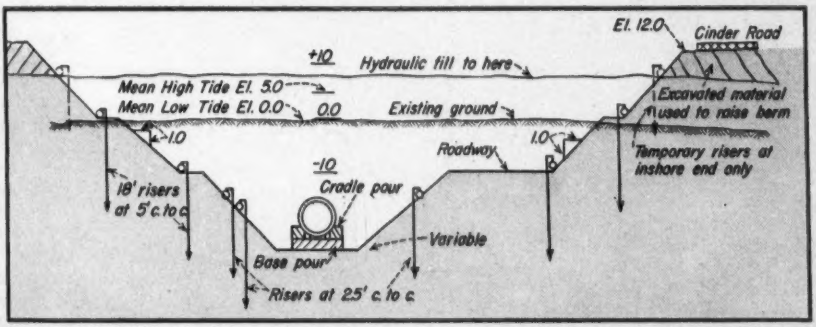
SOAP FROM INCENDIARIES

Napalm, a solid mixture of aluminum soaps derived from cocoanut fatty acids, naphthenic acids, and oleic acid, and used during the war to thicken gasoline into jelly for fire bombs and flame throwers, is now being converted into a general purpose liquid soap. By stirring with sulphuric acid, then boiling with steam, then mixing with caustic soda, the napalm is hydrolyzed, producing a black, somewhat germicidal soap.—CHEMICAL ENGRG.

MATHEMATICAL MUSIC

Beams of light shining through a rotating transparent disk carrying opaque tone patterns actuate a phototube, and the resulting electrical pulsations are amplified and fed to a loudspeaker and the deflecting plates of an oscilloscope, producing music that can be "seen" and heard. The disk is an 8-in.-dia. sheet of positive film made by photographing a tone design drawn on a 4 x 4-ft. wallboard. The light is supplied by 10 flashlight bulbs mounted in 2 rows, ½ in. from the tone wheel so that each bulb illuminates a space equal to the width of one set of tone patterns without overlapping.

The bulbs may be lighted in any combination, allowing harmonics to be blended with the fundamental in an infinite variety of combinations. By simulating a pleasing musical note and comparing on the oscilloscope, little differences which add or detract from the final tone picture can be discovered. These can be used to prevent electronic-instrument music from sounding mechanical. The tone disk can be designed for complex as well as sine waves, and music can be written and produced much the same as cartoon-movies—on a drafting board. —ELECTRONICS



SEWER TECHNIQUE—An outfall sewer line into Jamaica Bay, N. Y., was constructed by pumping in a hydraulic fill, then draining the fill with wellpoints. Opened to a maximum depth of 30 ft. below mean low water, a 1,350-ft. trench used 7,000 ft. of header pipe, with 16-ft. risers at 2.5 to 5-ft. centers. Expensive sheetpile cofferdams or difficult underwater work were thus eliminated. Section across trench is shown. —ENGRG. NEWS-RECORD

FOILS PUNCTURES—Designed to reduce speed of deflation when punctured, U. S. Rubber Co.'s new innertube has a gridwork of pockets containing extra butyl rubber which crowds around a hole to retard air flow so that motorists can reach a service station. —BUSINESS WEEK

SPECIAL ARCHITECTURE FOR MILK PLANT

Designed for rapid, economical erection, a 4-story milk processing and bottling plant in New York has a floor system of steel girders and concrete beams of the same depth. Second-floor beams are bolted to the columns, and may be removed without affecting the stability of the building. All floors are constructed in 20 x 22-ft., 5-in. concrete panels of steel framing between steel columns, and panels can be altered independently, thus providing for future conversion.

To simplify formwork, concrete beams, comprising a 2-way, negatively crimped, wire-mesh-reinforced system supported by steel girders, are all cast 8 in. wide. While depths of members vary from floor to floor, at any one level they all have the same depth. Interior walls are lined with ceramic, glazed, terra cotta tile blocks to resist milk acids and to facilitate cleaning. —ENGRG. NEWS-RECORD

CHEMICAL CLEANERS EASE SCALE REMOVAL

Boiler and heat-exchanger scales usually are sufficiently soluble to be removed relatively easily with one or more of the many solvents available, giving the equivalent of added capacity by reducing outage time for mechanical cleaning. While calcium sulphate deposits, some silicates, and refining scale are difficult to dissolve, those containing certain percentages of calcium sulphate and about 80% of the silicate scales are removed satisfactorily. Scales with solubilities as low as 40% often can be loosened because the dissolving action on the soluble portion disintegrates the less soluble elements, which are then flushed out.

Numerous scales are soluble in inhibited hydrochloric acid to which have been added suitable auxiliary agents that increase the solubility of the scale and control the surface tension of the acid to increase its ability to wet the scale.

Some deposits require special chlorinated solvents, while others need organic ones. Alkaline and some organic cleaners remove oils and greasy dirt in the scale, but the scale itself generally requires an acid cleaner.

The following table compares the properties of three acids.

Property	Hydrochloric Acid	Nitric Acid	Sulphuric Acid
Cost.....	Economical	Relatively expensive	Economical
Inhibition.....	Easy	Difficult	Easy
Hazard in handling	Little	Serious burns	Dangerous
Mixing with water	No trouble	No trouble	Large heat of dilution
Reaction products	Very soluble	Very soluble	Insoluble $CaSO_4$ formed
Additive agents.	Many available	Little known	Little known
Speed of reaction	Rapid	Rapid	Fairly rapid
Commercial concentration	28-32%	52%	77-93%

Commercial hydrochloric acid (28 to 32% hydrogen chloride by weight) proves better than sulphuric for scale removal. —POWER

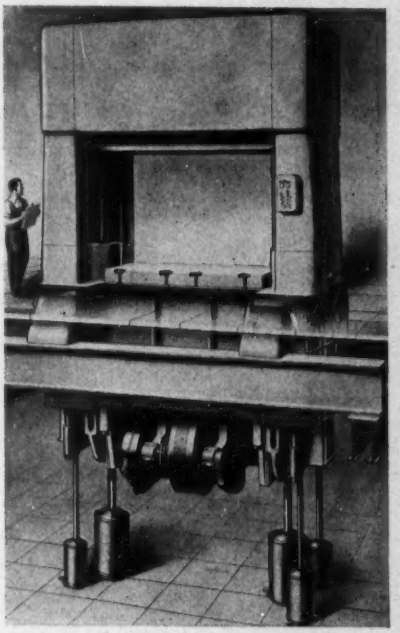
WANT:	THEIR DESIRES ARE MET BY:
Fair Appraisal	Specification of responsibility and authority. Standards of performance. Rating and personal performance review.
Training Aids	Foreman's manual of standard practice. Technical Training. Managerial training. Labor relations training.
Due Recognition	Properly evaluated salary structure. Advances within salary range on recorded merit. Promotions to higher positions on recorded ability. Privileges adding to prestige. Instructions via the line only.
Right of Appeal	Formal grievance procedure. Uniform disciplinary standards.
Management Participation	Two-way flow of information and ideas. Supervisors' policy committee staff meetings. Frequent contacts with top executives. Knowledge of plans, policies, costs and profits.

WHAT MINE BOSSES WANT—By individual interviews with 150 coal miners in supervisory positions, a company obtained definite reaction to its personnel policies. The foremost "want" was a security program (above). The survey increased supervisor confidence in company leadership, and gave officials a firm basis for policy reorganization. —COAL AGE

CONCRETE PIPE JACKED UNDER RAILROAD

Pressure applied to a jacking unit by an oil-operated hydraulic ram forced a total length of 75 ft. of 48-in. extra-strength reinforced concrete pipe under 5 main-line railway tracks near Chicago. The ram was anchored against a 35-sq. ft. backstop of ties and H-beams, and exerted pressure on the 5-ft. tongue-and-groove pipe sections through 4-in. thick oak timber assemblies.

A cutting shield of ⅝-in. steel plate, 30 in. wide, projected 18 in. in the shape of a bonnet past the end of the first section. This shield protected the worker excavating in the pipe, and could be adjusted to control vertical alignment. Pressure was applied continually during the operation, and reached 7,000 psi. as the last section was installed. The vibration from trains had a slightly beneficial effect. —ENGRG. NEWS-RECORD



EASILY MOVED PRESSES—General Motors Corp. is hanging heavy presses between steel rails jutting up from the floor in its new automobile body factory so they can be picked up by overhead cranes and moved almost as readily as office desks. The 800x160-ft. press pit is honeycombed with 2-ft.-wide girders resting on reinforced concrete columns built up from a 36-in. concrete floor. The long girders, in turn, support other girders placed at right angles and as far apart as the width of the press. After the machines are in place, 4-ft. sections of removable pecan wood flooring will be laid. The gearing, air tanks and other supplemental equipment of the new presses have been moved to the bottom lowering the center of gravity for stability. —BUSINESS WEEK

RADAR LANDS FIGHTERS ON CARRIER AT NIGHT

Combat aircraft can be landed safely on a carrier deck at night or during poor-visibility conditions by a new Navy radar-approach system. With this Carrier Control Approach, there are 3 controllers, each using a specialized radar. The initial controller talks to the pilots over h-f radio while they are 20 miles away, organizes the planes into sections, stations them around the ship. A new precision air-search radar permits him to direct the aircraft so as to prevent collisions.

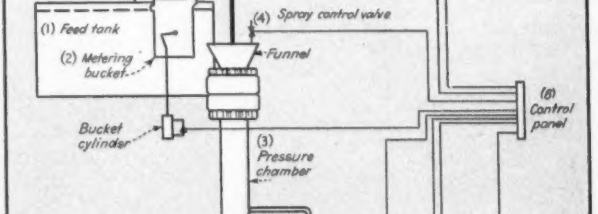
A second controller takes charge of a group of planes stationed 5 miles astern the carrier and orbiting at 500 ft. By means of surface-search radar and the pilot's radio calls, he identifies the craft and starts one in for a landing while the others continue to circle.

Controller Three brings in the plane. A special airborne radar, called the "Eagle", precisely tracks any plane within a 5-mile area, and using this the controller instructs the pilot to let down to 100 ft. and reduce airspeed for a normal approach. He keeps the pilot informed as to distance from the carrier and gives him exact compass headings.

Listening in on the radio, the Landing Signal Officer hears the controller count off the plane's distance from the carrier, and when the craft is but a few hundred feet away, he sees it and says "contact" into the microphone. That is the pilot's cue to cease concentrating on his instruments and obey the LSO's signals. During darkness, the carrier's indirect deck lighting is turned on for a few seconds after the pilot is in landing position. —AVIATION

UNIT SUBSTATIONS FAVORED

Tried and accepted by public utilities, standardized unit substations are proving important in solving industrial-plant electrical problems. Reasons: Cost less because mass produced; simplify engineering problems of user and require fewer spare parts; several smaller substation units provide better continuity of service than one large unit; better voltage regulation is attained; material is saved, with small unit close to load it serves. —POWER



GUAYULE SEPARATION — In the flotation step, in which finely divided guayule plant fiber sinks and is separated from floating rubber, particles of cork must be removed. Conventional batch pressure treatment interrupted an otherwise continuous process. In the semi-continuous water-logging treatment shown, scoop fills metering bucket which then empties into chamber where water and piston raise pressure to 2,000 psi. for 20 sec. Spray (4) cleans top valve, fills chamber, and flushes out residual rubber. — CHEMICAL ENGRG.

Improvising in Construction

In meeting unusual conditions, originality and imagination continue to be among the best tools of an engineer

Pushtractor Loading—Coarse, heavy, damp sand in a borrowpit being used for highway construction in Michigan was successfully handled by special 24 x 24-in. pushplates mounted on tractors and scrapers. Conventional pushplates were inadequate, the material rolling ahead of the scraper cutting edge rather than flowing back into the bowl. The job-designed plates, large enough for full contact under all loading conditions, were designed to give a slight uplift to the tail of the scraper, thus holding the cutting edge down. Each tractor plate was fitted with all-around cupped edges. On the scrapers a heavier block was added to the tail pusher bar, and large plates were added to the front of each scraper wheel tractor to enable the scrapers to act at pushers.

Winterized Equipment — Establishing bases for oil exploration in the 35,000-sq.-mile petroleum reserve at the northern tip of Alaska, Navy Seabees operated on ice, snow, and frozen tundra, in temperatures as low as —40° F. and winds up to 90 mph., yet delivered in 3 winter months 1,000 tons of supplies and drilling equipment over a 330-mile trek. Heating coils kept the equipment's lubricating oil fluid at low temperatures. Metal ducts supplied warm air to the other vital machine parts of tractors, trucks, prime movers, bulldozers, weasels, fork-lift tractors, and cranes. Enclosed cabs for operators were added to most machines. To prevent freezing, tractor engines were run constantly during the 330-mile trip. Seabees report that well-insulated hydraulic bulldozers with oil-warming equipment function more successfully than cable-operated machines. Self-mounted bunkhouses, containing galley, radio equipment and repair shop, traveled with the tractor trains.

High-lift truck loads tracked Weasel onto plane for trip to Pt. Barrow, 5 deg. north of the Arctic circle in Alaska. More than 500 tons of air cargo were handled during 1 month at this sub-zero airfield. Electric lift trucks moved materials quickly.

Cast Sheetpiles—In building 5,000 ft. of cantilevered concrete flood wall in Missouri, sheetpiles are being cast on oiled concrete platform within sectional steel forms that are easily set and stripped. Taper-end driving points of the 10-in. thick, 30-in. wide, 16-ft. long sheetpiles are formed by bent plates that snap into place. Reinforcing cages are suspended from rods across tops of sideforms. Tongue-and-groove joints ensure firm contact between adjacent piles. Dowels from the reinforcing bar mat extend through perforations in the interlocking steel sheets, and serve to tie into the foundation slab. The piles are cured by wet earth, then pulled loose from the group of several units, lifted by special tongs and driven by jetting and by a steam crane which is fitted with swinging leads. —CONSTRUCTION METHODS

FORD EFFICIENCY—In Ford's piston - machining department efficiency has been increased 25% by replacing skid boxes with conveyors. Operators now handle pistons with a minimum of body movements, with rhythm, and there is no reaching above shoulder height. Nicking of pistons in handling is virtually eliminated. Example: Overhead chain conveyor brings pistons to milling operation, then belt conveyor carries them to centerless grinders. Six- and 8-cyl. pistons are on one belt, separated by guides. —AMERICAN MACHINIST

ELECTRIC SOIL CABLE HEATS HOUSE FLOORS

Recent West Coast idea in heating houses is to bury No. 19 soil heating cable in the concrete floors. A total of 60 houses built by 3 contractors will have this type of radiant heating.

Practice is to place a 3-in. slab of vermiculite concrete on a base of weatherproof-paper-covered rock ballast, lay the heating-element wire on this slab on 4- to 6-in. centers, then cover with 1 in. of concrete, stone, or tile. Rug pads, room-size rugs, or linoleum complete the floor.

In a typical installation, the lead-sheathed cable was laid in 120-ft. lengths, providing 900-watt circuits on 240 volts, to give a density of about 20 watts per sq. ft. Maximum operating temperature of the wire would be 140° F., and the corresponding floor temperature would be 85° in zero weather—75° is expected to be comfortable. Control is thermostatic, but temperature-lag problem has not been solved.

Cost for 3,600-sq. ft. house is under $1,000, compared to $2,600 for a gas-furnace system. —ELECTRICAL WORLD

RESIN CONTROLS SHRINKAGE

Dur-Lana, a new shrink-proofing resin of Warwick Chemical Co., exhausts out of the bath and requires no after-curing, thus giving shrinkage control to knitted wool fabrics such as hosiery. Besides the usual method of treating the dyed fabric, an alternate method for applying Dur-Lana by exhaustion has been developed. Material is treated for 5 min. in 140-160°F. bath containing 20-30% common salt. Required amount of resin emulsion is added, and, 10 min. later, 3% of 56% acetic acid. Exhaustion is evident when milky-white solution clears. Rinsing follows. Dur-Lana also exhausts onto mixtures of wool and viscose, acetate, or nylon. —TEXTILE WORLD

SMOKESTACK UNDERPINNED WHILE OPERATING

In imminent danger of collapse because its wood-pile foundation had rotted, a 175-ft., 800-ton, brick smokestack of United Cork Co. was underpinned while in service. The 65 outer piles were cut off one at a time 18 in. below groundwater level, then I-beams weighing 25.5 lb./ft. were placed on end between steel plate on top of each cut off pile and plate over hole left by pile butt in stack foundation. Wedges driven between plates and beam loaded the pile. Then concrete was poured around pile tops and I-beams. —POWER

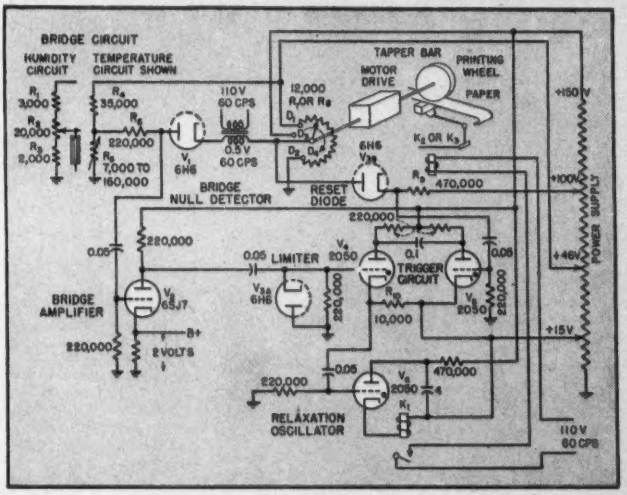
PHILIPPINE SUGAR CHAOS

Of the prewar total of 41 sugar milling establishments in the Philippines, only 6 (all in Luzon) are in condition to operate. Their total production for the recent milling season was ⅓ of one day's prewar output. Rehabilitation of the industry is slow because of temptation to sell cane shoots for milling (2.2 lb. brown centrifugal sugar brings $1 to $1.30 locally) rather than to use them for seedlings. Shortage of fertilizers, work animals, and tractors, add to the dilemma. Labor unrest and bandits are retarding reconstruction.

Experts consider that the overall inefficiency, due to wasteful competition among overlapping national interests, would be eliminated by amalgamation of milling establishments. Industry may be restored by 1949. —FOOD INDUSTRIES

WATERWORKS BASIN DREDGED WHILE IN SERVICE

More than 540,000 cu. yd. of silt were removed by an electrically operated suction dredge from a sedimentation basin in Philadelphia, without interrupting service or increasing turbidity of basin effluent. The sediment was deposited as a hydraulic fill in an adjacent compounding basin. To prevent turbidity, discharge line was assembled in longest length needed for entire operation, and 1½-2 ft. of dredge discharge was held above settled silt in the disposal area. Drainage of the discharge water from disposal area was possible through storm sewers. —ENGRG. NEWS-RECORD



ELECTRONIC CONTROLLER-RECORDER— This device records temperature and humidity every 15 min., starts dehumidifying equipment if the sum of 8 remote humidity readings exceeds a set value. Remote temperature indications are obtained by ceramic resistors whose resistance varies 4% per deg. C., and humidity values are given by human-hair elements. A synchronous motor rotates potentiometer arms (D_1-D_4), and at balance printing bar relays (K_2, K_3) are energized and the figure on the printing wheel corresponding to arm position is printed on record paper. —ELECTRONICS

Related Selling Pays

Alert distributor's salesmen, even though not trained and experienced industrialists, can frequently turn a $10 order into a $100 sale

In the rapidly expanding, increasingly competitive industrial fields of metalworking, chemicals, textiles, food, mining, construction, and power, many plants rely heavily on salesmen for reports on new techniques and new products. Always responsive to constructive suggestions, they are vitally interested in time- and labor-saving devices, in automatic feeds and controls, special handling units, safety arrangements, and schemes to reduce breakdown delays. Conscious of this need to progress, the industrial distributor's salesman is in an ideal position to offer helpful proposals for expansion, modernization, and replacement of equipment.

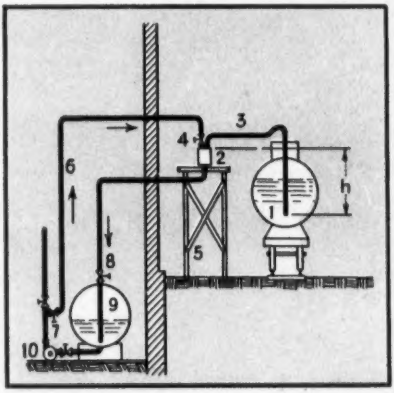
Besides his direct job of furnishing the right material with a minimum of delay, the salesman can, by training himself to think of the work and material related to any given product, substantially increase the volume of his sales and bring considerable benefits to his customer.

Covered by outer casings and hidden by safety shields are many small items—gears, pump packing, bearings, sealing compounds, cements, gaskets, cleaners, polishers, rust and scale removers—which he can add to the products he handles. In addition to the large needs of any project of construction or mining are innumerable articles: goggles, toe guards, hose clamps, aprons, hooks, cutter bits, fans, twine, brooms, belt fasteners, grease, work gloves, pulleys, and so on. The observant salesman will include these in his selling plans.

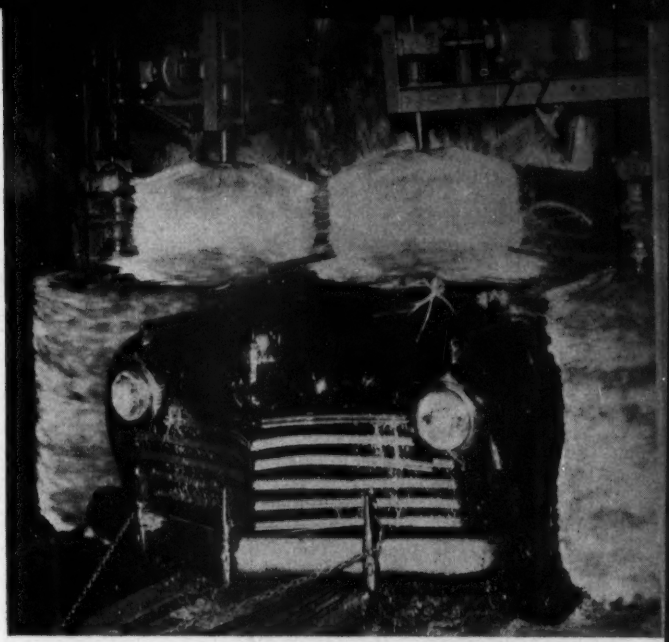
In textiles, for example—where there is a heavy, accumulated demand for new equipment, replacement parts, supplies and maintenance items—the salesman should think not only of shuttles, travellers and looms, but of hoists, trolleys, trucks, pallets, conveyors, and a host of smaller invisible related factory items.

The mysteries of a chemical process or the complexities of a power installation should not obscure the wide use of valves, gages, tubing, lubricants, insulators, pipes, hand tools, scales, filters, traps, meters, conveyors, fire extinguishers, searchlights, ladders, axes, pliers, or buckets.

Establishing a "chain of thought" habit will lead the salesman to a wider usefulness to his employer and his customer. When a client requests a valve, the salesman should keep in mind, and have information on, allied items: piping, joints and bends, washers, oil and grease, wrenches, bolts and nuts, electric drills, bits, meters, paints and enamels. This habit and this attitude will enable the salesman to share profitably in the expansion of industry. —MILL SUPPLIES



SIMPLE SIPHON—To empty a tank car (1) of acid, an auxiliary vessel (2) is filled with acid by a plant pump (10) and when cock (4) is closed and cock (8) opened, siphon action draws acid through pipes (3) and (8) into receiving tank (9). Cheap and simple, the system permits simultaneous discharge of several cars. —CHEMICAL ENGRG.



QUICK AUTO WASH—As an automobile moves along an endless track in Paul's Minit-Man Wash, Detroit, seven big, soft, motor - driven revolving brushes remove dirt as water sprays over the surface. Two men sponge untouched surfaces, air-streams start the drying, 2 more 2-man teams finish up. Time, 2 min.; price, $1. —BUSINESS WEEK

CREASE-RESISTANT SUEDE

I. G. Farben in Germany has produced a water-repellent, crease-resistant cloth that has a heavy suede effect. After complete desizing, spun-rayon fabric is passed through 9° Be. cold KOH solution 2-4 times. Following hot and cold rinse, 2-4 runs through 10-15% (by volume) cool nitric acid solution, a long cold rinse, and neutralization by soda-ash, a finish of ethylene urea and melamine resin, and/or urea formaldehyde is applied in a single bath. —TEXTILE WORLD

POP CORN BREAD

Twenty wholesale bakers are producing bread containing 25% pop corn flour and 75% wheat flour. H. Piper Co., which originated the product, sells the pop corn flour at $8.75 a cwt. and collects 1¢ a wrapper royalty on products containing it. Special, heavy milling equipment makes the flour from extremely hard frost-bitten pop corn, useless for popping. The first bread made fell flat, but the trouble was overcome by subjecting the pop corn flour to a high heat treatment so that it would mix readily.

Pop corn muffins also are made, doughnuts will be. —BUSINESS WEEK

FOR THE HOME

Having automatically washed, rinsed and damp-dried a batch of laundry in 22-30 min., a vibrationless washer of Appliance Corp. of America cleans itself and shuts off. An oscillating metal sphere with heavy rubber liner uses a top-flow principle to do the work. Under hydraulic pressure, rubber liner rises to squeeze water and soap out of clothes . . . Before a mouse reaches the bait, an electric shock kills it and muscular reaction throws it clear, leaving the ac.-dc. trap produced by Ratchford Engineered Products ready for another victim . . . Combining fluorescent light, picture frame, and stand, a product of Photo-Vision, Inc., is obtainable in variety of colors and sizes . . . Thor has a washer with 2 interchangeable baskets to wash clothes and dishes.—ELECTRICAL MERCHANDISING

TECHNICAL SHORTS

Helium Traces Oil—With a new technique developed by the Bureau of Mines and the Navy, helium is used to detect the movement and extent of underground deposits of oil and gas. It is injected into wells, and by observing the outlets at which it emerges, data are obtained on the contour of the reservoir, while helium concentration gives an index to its character. —BUSINESS WEEK

Better Antenna—Used for some time in direction finders, low-impedance loop antennas are of particular value in console-type home radio receivers. These antennas are stable, because their inductance ordinarily will not change with age and humidity as much as that of high-impedance loops. Placement of leads is not as critical, and normal manufacturing variations can be compensated with the antenna trimmer. —ELECTRONICS

Shaped Charge More Effective—A slab, hanging high in a finger raise and blocking the flow of ore in a Utah mine, was not even cracked by 2 bomb bundles, one of 20 and the other of 40 sticks, but a 13-stick shaped charge placed in exact center on the underside pulverized ½ the boulder, thoroughly cracked other half. —ENGRG. & MINING JOURNAL

Saves Plane Designer's Time—Many man-hours can be saved by using the comparison method in estimating the performance of an airplane of experimental design. By properly modifying the maximum-speed drag-breakdown data for a known plane, the data for a somewhat similar experimental craft can be determined with 2% accuracy. —AVIATION

Flour-bag Clothes Popular—Flour and feed sacks made of printed cotton and osnaburg cloth have become important buying incentives in the milling business. Housewives reuse them to make dresses, curtains, pillow covers, and other articles. One miller uses a paper label applied to the sack with water-soluble paste for easy, complete removal by the customer. —BUSINESS WEEK

Compaction by Wellpoints—Sand fill in an area to be used as a building site in Indiana was increased in density from 87.5 to 97.5 lb. per cu. ft. by flooding for 96 hr. to a minimum depth of 6 in., then dewatering and compacting by wellpoint systems of 100 wellpoints attached to 12-ft. riser pipes, 600 ft. of header pipe and a 1,700-gpm. wellpoint pump. —ENGRG. NEWS-RECORD

Aid to Anodizing—To insulate the anodizing tank from the parts being treated and prevent short circuits, a protective wall of interlaced Saran plastic tubing is placed around the inner sides of the tank at Otis Elevator Co. —ELECTRICAL WORLD

Drill-press Planer—With single sheer-type cutting blade, one-spot blade adjustment, hand- and eye-guard, and bell to direct flying chips downward, a rotary planer offered by A. D. McBurney fits any rotary drill press, will plane, rout, panel, bead, or rabbet to any depth. —CONSTRUCTION METHODS

Cargo Plane Refrigerated—To protect perishables, the entire 2,000 cu. ft. of insulated cargo space in Slick Airways C-46E freighters is cooled to controlled temperature by air blown over dry ice in an aluminum-alloy cooler. A sprinkler cools the fuselage skin on hot days. —AVIATION NEWS

KEYS CUT DIE COSTS—The time-consuming, tool-steel-wasting method of backing up dies by accurately fitting them into pockets cut into the die shoe has been replaced by a better technique at Caterpillar Tractor Co. Dies are now backed up by machinable keys which are press-fitted into shallow slots cut into the shoe and then fastened to the shoe with capscrews. Some advantages are: die shoes can be used as received; keyways easily can be machined accurately; keys are easily adjusted by grinding steps on side faces or by adding metal by welding; height and width of tool-steel die members can be less, cutting cost. —AMERICAN MACHINIST

Variable R-f Heating—The output of vacuum-tube oscillators for industrial heating can be varied continuously by controlling the plate voltage. For output ratings from 5 to 100 kw., thyratron rectifiers have many advantages over power-transformer primary-control devices. —ELECTRONICS

Portable Plane Loader—United Airlines reduces loading time for its 4-engine, all-freight *Cargoliner* by using a portable electric winch that lifts 2,500 lb. at 30 ft. a min., can be plugged into outlets on the airplane. The winch is coupled with a 4-ft. boom which swings out from the big doors. —BUSINESS WEEK

Hybrid Onions—Adapted to the western states, a new hybrid onion, said to yield 50% more than the usual early varieties, has been achieved by the Department of Agriculture station in Maryland. —FOOD INDUSTRIES

Aircraft Shortcut—To save time, Taylorcraft Aviation Corp. dips an entire fuselage frame into zinc chromate primer contained in a large tank, instead of applying the coating by spray. —AVIATION NEWS

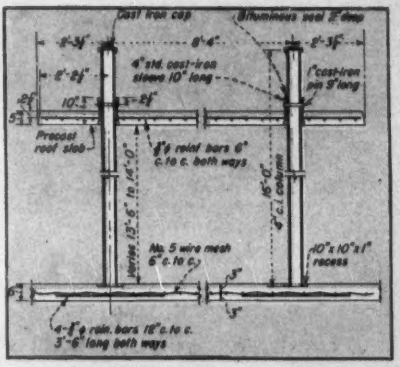
No-nail Scaffolds—To speed erection of scaffold for Guniting oil tanks in Oregon, knife-grip brackets, designed by Andrews Machinery Co., were clamped to posts. No nails were necessary, and scaffold members were reused many times. —CONSTRUCTION METHODS

German Insulating Material—Made from a urea formaldehyde foam, a new German insulating material weighs 1/10th as much as corkboard, has load strength of 0.2 kg. per sq. c. It is as cheap as cork, has same insulating value. —CHEM. ENGRG.

Soldering Speedup—Mounted in a micarta panel, two upright carbon electrodes which converge at the ends to a narrow gap that can be bridged by small parts, as a copper strap terminal, have facilitated electric resistance soldering at Westinghouse. Rheostat regulates current. —ELECTRICAL WORLD

Centrifugally Cast Lens—Cylindrical drum lenses for ship lights are centrifugally cast at the Genth glass factory in Germany. The glass is forced up the sides and into the prismatic cutting on the spinning mold. At the same time, the inner surface of the lens is formed without taper and with a high fire polish. The process is used for central portions of builtup lenses. —BUSINESS WEEK

String Cuts Solution Sample—By mounting a string across a small stream of unclarified pregnant cyanide solution which is diverted from pipeline to clarifier, the tendency of mechanical samplers to line up has been overcome in a mill in Ontario. Drops of solution run down the string at a uniform rate, and size of sample cut is varied by changing string angle. Steeper slope diverts more solution. —ENGRG. & MINING JOURNAL



PRECAST RESERVOIR—Walls of a 7-million gal. rectangular water reservoir in New Orleans are precast concrete slabs with tongue-and-groove joints. Resting on earth without piles, to minimize the possibility of voids and assure uniform settlement in the unstable soil, the reservoir is surrounded by an earthfill cofferdam of sloped, precast slabs. Outer cofferdam walls are tied at the top to inner reservoir walls by steel rods. The reinforced-concrete floor slab furnishes a continuous tie. Each precast roof slab is independently supported by pin connections to 4 cast-iron pipe columns extending upward through cast-iron sleeves in roof unit, this arrangement permitting future adjustment of roof slabs if uneven subsidence occurs. The V-joints are caulked with yarn and filled with pitch to cover the continuous wrought-iron rods which are used to tie opposing walls together. —ENGRG. NEWS-RECORD

Progressive Step—Construction of concrete steps is simplified, speeded, by an adjustable steel form which is set up in 15 min., holds full capacity without bulging. Tread width is varied by moving steel pins holding the step-front forms. Adam Pollman, contractor, is the inventor. —BUSINESS WEEK

Rotovane Tires Save Ton—In the largest landing gear assembly made—that of Lockheed's *Constitution*—weight has been cut more than a ton by tires with fins on the sidewalls to rotate the wheels at approximately 80% of landing speed. The fins are caught and opened by the airstream during bottom half of wheel revolution, lie flat in top half. —AVIATION NEWS

Copper Fins Cool Motors—To cool the stators of large, totally enclosed, a.c. motors, Westinghouse has replaced the air slots between stator laminations with copper sheet punchings exactly like the magnetic iron punchings, but extending 2-in. beyond them. The copper rapidly conducts heat from the iron and gives it up to air circulated by the fan on the rotor shaft. Thinner than air spaces, copper sheets reduce motor length. —ELECTRICAL WORLD

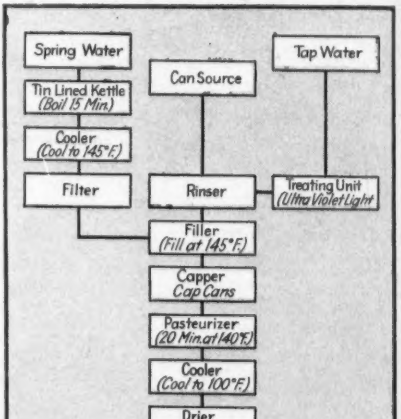
Technical Food Findings

Some results of research in preserve manufacture, in packaging of water, and in vegetable oil extraction promise savings and wider uses

Preserves — Studying conditions that produce the best preserve products through the year, an agricultural experiment station in Georgia found that preserves freshly made from frozen stock have better color and flavor than those made from fresh stock and stored at room temperature. Working with Golden Jubilee peaches and Blakemore strawberries, stock was kept for approximately 3, 6, 12, and 24 months by freezing, by canning, and by addition of sulphur dioxide solution. For similar periods, finished preserves of those fruits were stored in both dark and light at room temperature and at 0° F. Frozen fruits were thawed and sulphited fruits were boiled before preserves were made. All preserves were 45% fruit, 55% sugar.

Judging of preserves was based on appearance, color, consistency, fruit flavor, sweetness, acidity, bitterness, and texture, to which numerical values were assigned. No change of quality was noticed in any of the preserves after 15 months at 0° F., but at room temperatures, color, aroma, and flavor constantly changed. Light and dark caused no significant difference. Stock frozen for 24 months gave excellent results, as did freshly made preserves stored in freezing temperatures for 15 months. Preserves made from sulphited peaches were good only up to 6 months. The results indicate that refrigeration must be a part of high-quality preserve manufacture.

Packaging Water—Developed during the war for emergency purposes, metal containers for water now give satisfaction from standpoints of rust, freezing and high-altitude pressures, and long storage at tropical or arctic temperatures. Extensive tests showed that many mineral or spring waters can be canned in reclosable wax-lined containers without impairment of flavor or appearance. Cap-sealed cans, made of hot-dipped tinplate (1.5 lb. per base box) were given either a modified alkyl-enamel base coat followed by wax-lining, or an oleo-resinous enamel base coat followed by vinyl copolymer enamel. Caps used were crown, screw, or Williams Kork-N-Seal with rubber gasket insert. Flat-top cans with similar coatings were also used. A few cases of rusting, among the 4 million emergency units packed, developed when cans were repeatedly



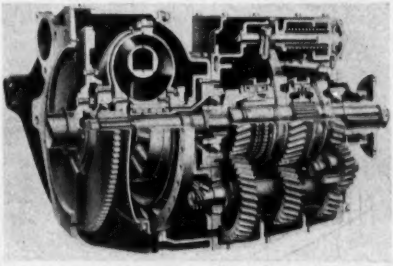
Flow sheet for filling 14.75-fl. oz. metal containers with 11 or 12 oz. of water (pH about 8.5) for emergency use in lifeboats, paratroopers' kits, and for getting water to isolated survivors.

frozen and thawed, but in no case was the water undrinkable. Highly alkaline waters cannot be canned satisfactorily because they soften the wax or enamel.

Increasing Oil Yield—Besides giving greater yield, a new solvent extraction system developed by research staff of Sherwin-Williams allows 1 plant to be used interchangeably for the extraction of oil from cottonseed, linseed, castor, and most oil-bearing seeds, nuts, and beans. The process extracts 98½% of the available oil from vegetable matter, cuts time from 3 hr. to 1 hr., increases the percentage of top grade oil from 75 to 98, and makes the residual meal marketable for glue, resins, emulsions, cloth and paper. The proteins are not degraded. Yields exceed other known recoveries to the extent that, in normal years, increase in vegetable oil will reach 40,000 tons. —FOOD INDUSTRIES

BLASTING NOT DANGEROUS

From a great variety of investigations carried on over the past 15 years, the unanimous conclusion is reached that normal blasting operations cannot produce vibrations capable of causing damage to structures of any kind. The majority of complaints of alleged damage arise from the perceptibility and psychological effects of air-borne noise and concussion on nearby residents. —COAL AGE



HYDROTORQUE DRIVE—Combining the advantages of hydraulic torque converter and hydraulic coupling by permitting the reaction member to rotate in one direction while held stationary in the other, this automatic transmission of the new White buses achieves an extremely high starting torque. —BUS TRANSPORTATION

FOUNTAIN PUMP—Useful at rural schools, parks, and picnic grounds, Baker Mfg. Co.'s new pump builds up pressure which keeps a stream of water flowing long enough for the pumper to walk around to the fountain and drink sanitarily. A catch basin underneath serves birds and other animals. —BUSINESS WEEK

METAL HARDENED IN WATER BY INDUCTION HEATING

To permit high-frequency tempering of the inner surfaces of tiny holes in gears and bushings, the inductor and the part are immersed in water 1 or 2 mm. apart. This keeps the miniature inductor from melting. Since water is a poor conductor of electricity, loss of current through it is not great. And the steam which forms at the surface being heated is a poor heat conductor, so that the loss of heat is small. Introduced by Soviet industry, the method produces a surface 50-100% more durable than attained by previous techniques. —WELDING ENGR.

RAIL GIANT—New 6,000-hp. diesel-electric locomotive developed by American Locomotive Co. is relatively light because the three 2,000-hp. engines weigh only 18 lb. per hp. G.E. aircraft turbosupercharger is responsible for about 40% of power developed by the normally 1,200-hp., 16-cyl., V-type, 4-stroke cycle, 9x10½-in. engine. With 3 engines and 3 main generators instead of conventional six, less control and auxiliary equipment, maintenance is reduced. An electric governor replaces the conventional flyballs. —AMERICAN MACHINIST

METALLIC THREAD THAT WON'T TARNISH

Metallic thread that doesn't tarnish because it is protected by thin acetate film is now in production by Dobeckmun Co. Lighter than ordinary metallic yarn, it is made by laminating both sides of aluminum sheet with the acetate film, using a special synthetic adhesive. The sheets are then slit into $\frac{1}{32}$- and $\frac{1}{64}$-in. thicknesses. In addition to this flat form, the yarn can be made as a round thread, wound around a coarse yarn, or a novelty thread combined with other fibers.

Easily adaptable to existing textile machinery, the yarns are available in gold, silver, and copper colors, with iridescent hues scheduled to be produced shortly. —BUSINESS WEEK

RAMP CONTROL SMOOTHS AIRPORT OPERATIONS

By coordinating, in a "ramp control office" on the flight line, the contact lines between its departments, the United Air Lines office at Burbank has made substantial savings in time and work, has increased income, and regularly sends out fully laden planes—on time. The controller in the strategically located office receives, by telemeter from other stations, information about Burbank-bound planes, and, by radio from those planes, further details. By phone, the controller contacts all departments concerned: commissary, cabin supply, air cargo, reservations, cleaning crews, passenger service, maintenance, etc. When the plane lands, there is no delay. Controller can watch the progress of servicing the plane, can check on omissions.

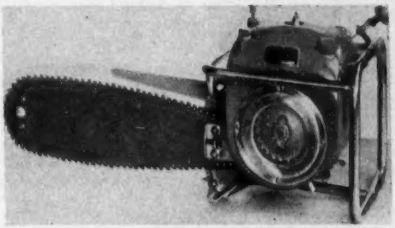
Being fully informed, department personnel have more time, and trucks and bins can be kept stocked.—AIR TRANSPORT

NO DECAY IN REFUSE-FILL

Investigating the condition of a 16-yr. old garbage and refuse fill near San Francisco, city officials discovered very little decomposition, no hydrogen sulphide gas, no rust, some evidence of electrolytic or galvanic deterioration. Newsprint was well-preserved, fruit and vegetables were dry and hard but had retained their color. Considerable compaction had occurred, due to the use of 2 ft. of cover for 4 ft. of fill, but the area will be suitable for nothing but light structures. —ENGRG. NEWS-RECORD

RUSSIAN POWER PROJECT

To be built on the Dneiper River 7.5 miles north of Kremenchug, a new Soviet hydroelectric power plant will provide 1½ billion kwhr. annually. It will serve the adjacent Donbas and Krivoi Rog iron-ore field, as well as Kharkov and Kiev. It is to be linked with the Dnieper Hydroelectric system. —POWER



ONE-MAN POWER SAW—Suited for timbering, heavy construction work, and plant and shipyard maintenance, this 52-lb., 20-in. capacity saw has a 4-hp., 2-cycle, air-cooled gasoline engine, is operated by 1 man. Positive fuel injection enables motor to operate at 90 deg. angle. Larger capacities for 2-man operation are available from the makers, Reed-Prentice Corp. —MILL SUPPLIES

AUTOMATIC SPECTOGRAPH ANALYZES MATERIALS

To study the molecular structure of plastics and other nonmetallic insulating materials, Westinghouse has developed an automatic recording infrared spectcgraph, an improvement over wartime instruments.

Infrared rays from an incandescent silicon carbide rod are beamed through the sample material and are directed along a 30-ft. path by highly polished mirrors and 2 large prisms. The prisms spread the beam into a spectrum, and a metal slit allows one wavelength at a time to pass to sensitive receivers. These convert the ray into electric current, amplify it, and electronically record the intensity. With all wavelength values on the chart, the structure of the material is revealed, since each chemical compound has a definite infrared transmission pattern.

—BUSINESS WEEK

NOISELESS AIRCRAFT

From viewpoint of quiet operation, the ideal lightplane propeller is a wide-blade, fan-type, airscrew of multiblade design. That is the conclusion of a National Advisory Committee for Aeronautics physicist whose studies show: Starting with the noise level of a typical 2-blade propeller with a tip speed of 85% of the speed of sound, the noise level can be reduced 25% by a 4-blade propeller turning at 50% of the speed of sound and 90% by 8 blades turning at 25% sonic velocity. These figures are based on an airplane speed of 75 mph.

A properly designed propeller and an effective engine muffler such as used on automobiles could quiet a plane until it would not be heard 300 ft. away.

The sound-reducing effect of a ring around the propeller tips is not significant.

Little vibration trouble with multiple, thin-blade propellers is expected at less than 100 hp. —AVIATION NEWS

NEWER SYNTHETIC FIBERS—Effort toward the development of new, improvement of old, and blending or radical modification of existing synthetic fibers has produced many with actual or potential desirable properties. Present U. S. emphasis is on fiber so low in price that it can be blended to cheapen cotton yarn. —TEXTILE WORLD

Fiber	Status	Spinning Method	Types Made	Strength in g.p.d.	Approximate Elongation	Comments
Alginates	Foreign experimental	Wet	Multifilaments	1 to 2	3 to 15%	Seven types being tried, some water soluble.
Ardil	British limited com.	Wet	Staple	Weak	50%	A protein wool-like fiber.
Hollow fibers	Experimental	Wet	Hollow staple	1.8		Viscose-type staple.
Pe Ce	German wartime com.		Staple and multifilaments	1.8 to 2.2 3 to 5	40%	Chlorinated polyvinyl chloride.
Perlon	German commercial	Dry	Multifilaments	Up to 7	14 to 20%	Variety of Perlons made.
Polyethylene	U. S. and German experimental	Melt	Monofilament	Weak	100 to 600%	Can be cold drawn.
Polystyrene	German experimental	Melt	Coarse filaments	1.5		
Polythioures	Experimental	Wet or dry	Multifilaments			Filaments spun as fine 0.5 den.
Polyvinyl alcohol	Experimental	Dry	Mono and multifilament	Up to 2.5	25%	Soluble in hot water.
Polyvinylidene chloride	German experimental	Dry	Monofilaments	3 to 4	Good	Multifilaments possible.
Sarelon	Experimental	Wet	Staple and multifilament			Peanut-protein fiber.
Zein	Experimental	Wet	Staple and multifilament	1 to 1¼	200 to 400%	Fiber finer than 0.6 den. possible.

WELDED STEEL HOUSES FOR MASS PRODUCTION

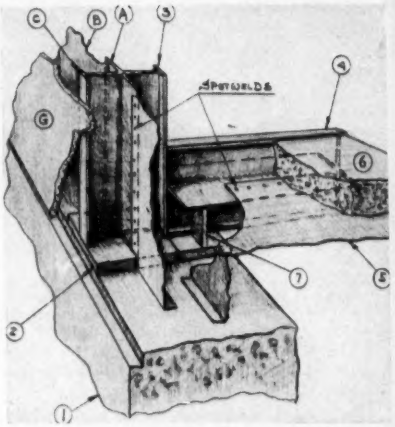
Using the new F-beam (rolled with an extremely light section) as wall studs and floor beams, the assembly fixture and portable spot-welder can do for house construction what they have done in the mass production of automobiles.

The stud beams are set on small steel base plates (drawing) on the foundation and held in place by fixtures and clamps. Light-gage metal sheets are spot-welded to the flanges of the beams with series welding guns and then sprayed with a protective metal paint which serves as a sealing medium and as an adhesive for insulating blankets.

Inside and outside walls are attached to the smaller flanges of the beams. Shingles can be hung to steel bars spot-welded across the flanges, or a brick wall can be held to the steel frame with spring-steel clamps. Wire mesh, metal lath, or wallboards can be used as a base for stucco, concrete, or plastic. Construction of the inside walls is similar.

Floors are made by pouring concrete over sheet metal welded to the beams, and they can be reinforced by corrugated sheet metal and wire mesh placed on top of the flat sheet. A plastic covering over the concrete gives a linoleum effect. Ceilings are constructed in the same manner as the inside walls.

At corners, inside and outside, horizontal metal strips are welded to the beam flanges to form a "box", and vertical corner rails are welded to these strips. Window frames are welded in place. —WELDING ENGINEER



New F-beam for wall and floor construction of spot-welded steel house. (1) Foundation; (2) small steel plates; (3) beam used as stud; (4) floor beam; (5) and (B) sheets spot-welded to beam flanges (A); (6) concrete floor; (7) foot or locator for floor beams; (C) smaller flanges to which inside and outside walls (G) are attached.

RURAL RADIO PHONES

Bell System's first experimental rural radio-telephone circuit connects 8 Colorado farms with the Cheyenne Wells central office. Transmission is by short-wave over a dipole antenna, power being supplied by the farm's wind-driven generator. Four farms have radio equipment, and the others have land lines to the farm radios. —BUSINESS WEEK

AIR TRAVEL DOUBLES

Almost twice as many passengers (12,000,000) will ride the U. S. Airlines in 1946 as in 1945. Passenger revenue mileage is up 78.88% for first 6 months of year. Mail ton miles dropped 45.48%, express, freight ton miles rose 13.07% in first half of '46. —AVIATION

CONDITIONED BUSES

With positive thermostatic controls compensating for every change in weather conditions, an automatic Sirocco blower system of temperature-controlled bus ventilation achieved by GM Coach engineers provides a complete change of fresh, filtered air every 1½ min. Reduced humidity prevents fogging of windows. A booster heater maintains engine temperature whether running or idle, and a thermal bulb and capillary tube connected to thermostat adjust for passenger heat load and solar radiation. Suction at ceiling and pressure at floor edges prevent air stratification. —BUS TRANSPORTATION

Chemistry Moves Ahead

Synthetic fuels and lubricants, improved paper coatings, new rubber reinforcer, nutritional and medical discoveries reported

Newest developments in products and processes to come out of the research-minded, war-boosted chemical industry were reported at the national meeting of American Chemical Society.

Synthetic Fuels—Petroleum derivatives are receiving much attention, as is the production of synthetic petroleum from natural gas. From synthetic petroleums have come such products as water-soluble lubricants, synthetic diesel fuels, and synthetic high-octane gasolines.

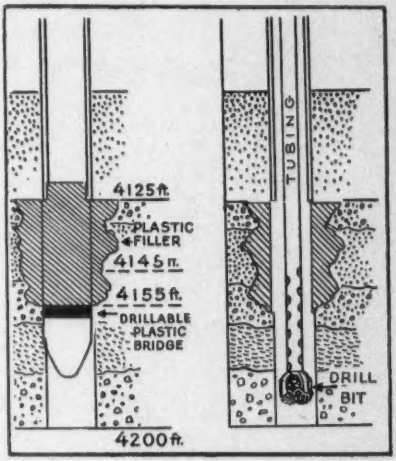
Better Paper—New cellulose acetate butyrate melt coatings will make possible improved wrapping papers, book and magazine covers, washable wallpapers, and better window shades. Depending on composition, the coatings show marked improvements in appearance, waterproofness, wet strength, and stability.

New Rubber Reinforcer—Waste lignin from the paper industry now is used as a reinforcing agent in high-strength, lightweight rubber articles capable of being colored. Lignin is only 72% as heavy as carbon black, so tires are 7% lighter and some other products, such as shoe soles, are 35% lighter. Easier milling is another attribute of the lignin-reinforced rubbers.

Nutritional Advances—Synthetic production of the amino-acids essential in nutrition was reported. Waste oat hulls were discussed as a source for synthetic cinnamon flavorings, the most promising derivative being furanacrolein. A rich source of pectin for fruit preserving and medical use has been discovered in sugar beet pulp.

Anti-tuberculosis Acid—A new chemical compound — trans-4-cyclohexylcyclohexane-carboxylic acid—was described as the most potent of several acids tested against a virulent strain of human *Tuberculosis bacillus*. While it has not yet been applied, it may be more effective than the naturally occuring chaulmoogric acid employed to treat the disease.

Soap from Garbage — Commercial yields of grease and oil-cake meal from dehydrated garbage were reported, making the waste a good source of soap, animal food, and fertilizer. With percentage of solids between 19 and 28, protein content was 14-23%, carbohydrates, 33-41%; fat, 17-22%; fiber, 8-12%; ash, 12-18%. Fertilizer analysis of the solids: nitrogen, 1-4%; phosphoric anhydride, 0.02-4%; potash, 0.43-1.1%. —BUSINESS WEEK



PLASTIC PATCH FOR OIL WELL—Gas-bearing strata around oil-well drill-holes can be sealed off with plastic by a method developed by Monsanto Chemical Co. and Oilwell Chemical Service Co. The perforated metal inner tubing is removed from the well and a plastic bridge with remotely controlled grippers is spotted just below the strata to be sealed off. Then a syrupy phenolic resin is introduced into the shaft and pressured into the porous strata around it. It hardens in 8 hr., and a drill cuts through the plastic plug to bring the well back to the desired oil-gas production ratio. —PRODUCT ENGRG.

NEW PRODUCTS

TWO-WAY BEARING—The 45-deg. tapered rollers in this new SKF Industries' bearing take a heavy thrust and substantial radial load, permitting 1 bearing to do the work of 2 in many types of equipment. An enlarged guide flange extending over the center of the rollers spreads oil over a larger area to minimize friction. A sleeve pressed into the bore of the inner ring provides a seat for a bronze cage and makes an easy-to-mount bearing assembly. —POWER

Induction-heating Flexibility—A flexible lead and coil developed by Induction Heating Corp. allows flexibility in induction-heating applications. Terminal voltage of the coil is low enough to minimize danger of arc-over to the work, making precise centering of the coil unnecessary. —AMERICAN MACHINIST

Package Substations — Ready-to-assemble components of a complete electrical substation are now offered as a "package" by General Electric Co. in any of hundreds of arrangements in ratings up to 45,000 kva. Steel structure is included. Substations are shipped in sections. —ELECTRICAL WORLD

Slip-end Springs—Intended to balance the rate of spring stiffness with the load carried, a spring suspension system introduced by Fruehauf Trailer Co. rests the ends of the bowed leaves on roller bearings. As weight of trailer load increases, bowed springs straighten, effective length is reduced, stiffness increased. —FOOD INDUSTRIES

Drills Square Holes—Polygonal holes are drilled with an SMM (Swiss) machine having a gear that rotates the drill about its own axis while giving it a circling motion about a central axis. No templets are used, so there is little wear on constructional parts. —AMERICAN MACHINIST

Spiral Rubber Idler—A new belt-conveyor idler of Chain Belt Co. is a flat-bar steel helical spiral covered with rubber. Simply snapped over the bar, the rubber retards and loosens icing, and reduces abrasive and corrosive action because of rubber-to-rubber surfaces and the ever changing point of contact. —COAL AGE

Automatic Quenching Press—Heated gears and other parts may be hardened without distortion while held in an air-operated automatic oil-quenching press developed by Gleason Works. Three preset timers control the quenching cycle. The machine handles parts up to 15-in. dia., and it quenches 10 to 120 an hour. —PRODUCT ENGRG.

Electronic Timer—For timing intervals as long as 30 min., a simple circuit, in which a negative feedback is used to extend the normal RC time constant, comprises the touch timer of the Kay Electric Co. Pushbutton control resets the timing cycle and a heavy-duty relay is provided for 10-amp., 115-volt circuits. —ELECTRONICS

Preserves Fish Nets—Claimed to increase the life of fish nets by at least 1 season, a plastic-base preservative dip of General Plastics Mfg. Co. dries quickly, increases net strength by 10%, affords resistance to fungi growths, increases abrasion resistance threefold. —CHEM. ENGRG.

Safety Air Gun—A cone-shaped blast of air released by a thumb button acts as a safety "umbrella" over the main air stream of the Guardair air gun to protect the user against flying chips or other particles. Made by Algonquin Parts, Inc., gun is available with standard or extended nozzle. —FACTORY

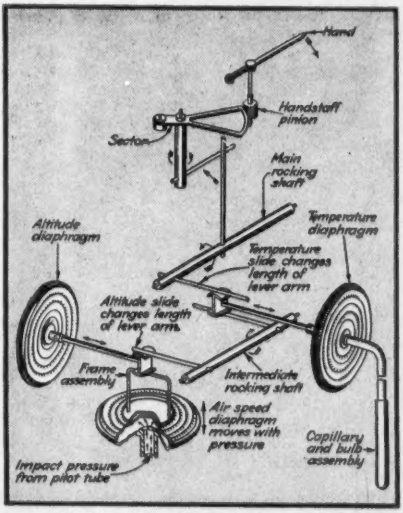
Washable Window Filter—Badger Corp.'s new window ventilator has a rustproof, weatherproof wire-mesh filter in an extending aluminum frame with rubber gaskets. After cleaning with hot water, the mesh is sprayed lightly with a special adhesive to catch dust particles. —BUSINESS WEEK

Paper Rugs—Paper-fiber rugs with improved resistance to water, wear, skidding, mildew, stain, and fading are now possible by coating the paper twine with flexible vinyl butyral developed by Monsanto Chemical Co. The fabric may be used for handbags, shoe uppers, slip covers. —SCIENCE ILLUSTRATED

Fast Fruit Bagger—Requiring a floor space of 10 sq. ft., a machine of Food Machinery Corp. bags fruit and vegetables at a rate of 2 bu. a minute. Rubber sponge at all contact points prevents bruising. —FOOD INDUSTRIES

Powdered-metal Damper—Designed to eliminate or reduce violent pressure pulsations in gages, a damper developed by Helicoid Gage contains compressed powdered metal through which the pressure medium must pass. Different porosities are used for air, gas, water, steam, and oil. —PRODUCT ENGRG.

Flameproof Electrical Wire—Consisting of a layer of glass fiber and a fire-resistant synthetic rubber, a new wire insulation developed by U. S. Rubber Co. won't burn, is 30% lighter. —AVIATION NEWS



BELLOWS VARY LEVERAGE—In the true airspeed indicator developed by Kollsman, corrections are made automatically for altitude and temperature. As the pressure decreases with altitude, the altitude diaphragm expands, moving a slide so as to shorten the length of the lever arm that turns the intermediate rocking shaft. The atmospheric-temperature bellows similarly changes the lever which turns the main rocking shaft. —PRODUCT ENGRG.

Better Truck Engine—Valve stems in the new 2½- and 3-ton, heavy-duty, Dodge truck engine are filled with powdered sodium, which liquefies under heat. Function is to convey heat from valve head to cooling water. Multiple-layer crankshaft and connecting-rod bearings and a clutch with 16 thrust springs to give uniform pressure are other features. —BUSINESS WEEK

Cuts Rails in Field—Developed by Air Reduction Sales Co. for railroad maintenance-of-way departments, a new portable rail-cropping machine consists of top and bottom carriage-mounted torches. The top torch cuts across the ball of the rail and half way down the web. Then the bottom torch completes the cut. —WELDING ENGR.

Quick Leak Detector—Normally used to detect 1 part of helium in 200,000 parts of air in vacuum systems, a General Electric instrument has been employed to test quickly for oil tightness each of 177 studs passing through large aluminum transformer cover plates. —POWER

Spare Tire Inflates Flat—With air hoses and valves made by Winkenweder & Ladd, Inc., a flat tire on an automobile wheel can be inflated to 15 psi. by connecting valve to that of spare tire at 30 psi. —BUSINESS WEEK

Grinder Control—In mills where peak grinding efficiency is required constantly an all-electronic device of Gal-Tronics Corp. gives precise control. Electronic equipment in a 66-in.-high cabinet controls the power supplied to a variable-speed, dc., feeder-drive motor, and response between feeder and an external load detector is instantaneous and direct. —CHEM. ENGRG.

Electric Scissors—Sheer silk or heavy woolens can be cut and trimmed by the new electric scissors (110-120 v. ac.) of Atlas Instrument Co. Button, pressed by thumb, starts and stops blade motion. —ELECTRICAL MERCHANDISING

Hacksaw Tensioner—A calibrated spiral spring in the Tensiometer attaches to the blade holder on power hacksaws to compensate automatically for changes of feed pressure and to correct for thermal expansion and contraction. It is a development of Millers Falls Co. —BUSINESS WEEK

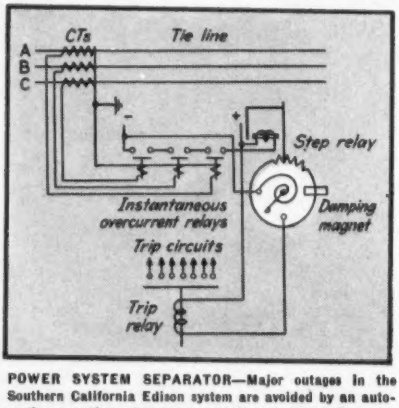
Dual Refrigerant Condenser—Niagara Blower Co.'s new automatic Aero-Pass refrigerant-gas condenser has a dry coil to reduce the gas temperature close to the condensation point. Then a second coil, sprayed with recirculated water that is evaporated in a fan-induced air stream, condenses the gas. Automatic control diverts a varying amount of the air stream through a recirculating duct to maintain full condensing capacity at all times. —POWER

NEW PRODUCTS

Stable Pigment Color—Claimed to give brighter, cleaner, more durable shades of brown for enamels, trim paints, coated papers, textiles, and plastics, an alkali-resistant pigment announced by E. I. du Pont de Nemours & Co. consists of extremely small particles of hydrated ferric oxide. —CHEM. ENGRG.

High-pressure Pump—Designed for forest-fire work, the high-pressure pump of Porto-Pump, Inc., has been adapted to placer mining, construction jetting, and oil-well survey work. Delivery over 43 gpm. at 100 psi., the pump is powered by 5-hp. engine, has a by-pass valve so nozzles may be changed while pump operates.—ENGRG. & MINING JOURNAL

Little Power Unit—With automatic clutch and transmission, a 56-lb., 6-hp. gasoline engine of Salsbury Motors, Inc., will power small scrapers, graders, concrete mixers, hoists, and winches. Designed to transmit power smoothly and at most advantageous speed, it has use in starting gas and diesel engines. —ENGRG. NEWS-RECORD



POWER SYSTEM SEPARATOR—Major outages in the Southern California Edison system are avoided by an automatic separation relay system which responds to slip cycles to trip breakers that separate and allocate loads in relation to generating ability. Only the generating station that is out of synchronization is automatically separated with its load. The system consists of 3 instantaneous relays with their current coils connected respectively on A, B, and C phases of the tie line between generating sources. The contacts of these three elements are in series, and in turn actuate a step-type relay set to operate on 3 slip cycles. The latter relay energizes a multi-circuit auxiliary relay to trip as many breakers as necessary to effect separation of the systems. —ELECTRICAL WORLD

Frying-oil Purifier — Operated with only 2 switches, and with signal lights to indicate temperature, a frying-oil purifier produced by Honan-Crane Corp. removes food particles and gummy residues, keeps acidity low, improves color, flavor and odor of oils and fats used in cooking or processing foods. Powered with ¼ hp. motor, it has a capacity of 20 to 30 gph. —FOOD INDUSTRIES

Automatic Bore Sizing—When the plastic-mounted abrasive stones in a reciprocating tool of a new Micromatic Hone Corp. machine have been expanded to the prescribed bore diameter, the plastic binds in a sizing ring, causing it to revolve and trip an electrical circuit that stops stone expansion on that particular spindle. —PRODUCT ENGRG.

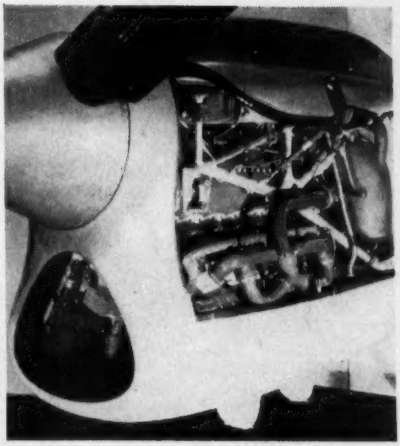
Air-drill Mounting—Permanently installed on mine cars, a new air-operated drill-jumbo mounting of Ingersoll-Rand Co. sets up and transports drifters, drill steel, hose, and accessories. Air columns are swung into vertical position by footpiece hinges, and air pressure forces column piston firmly against mine roof. Roof jacks and blocking are eliminated, and hand cranks reduce the effort required to move the arms and drifters. —COAL AGE

Printing Thickener—Chemically neutral, non-fermenting, nontoxic, a new thickener for use in textile printing is offered by George G. Johnston Co. Resistant to oils, alkalis, frost, and heat, the thickener (Ethulose) is easily plasticized, and gives flexible unplasticized films. —TEXTILE WORLD

Trussless Frame—Steel beams rigidly joined to form a frame eliminate the trusses and relegate secondary bracing to building contours, in a construction unit developed by McCloskey Co. Each bent has 2 columns and 2 rafters, and connections are field bolted. Overhead loads can be installed on the rafters at any point without structural alteration. Sawtooth, multiple-aisle, monitor-roof, and lean-to sections are available, for any type of 1-story building. —CHEMICAL ENGRG.

Clutch Releases on Overload—For machines processing easily damaged objects, a floating-disk clutch announced by Johnson Machine Co. automatically disengages on overload. —AMERICAN MACHINIST

Radio Power Converter—A rotary converter has been developed to take the place of the vibrating reed in powering automobile radios. The rotor consists of a vacuumized glass sphere containing 4 electrodes and a small amount of mercury. This sphere is inside a steel cell equipped with 4 wound poles, and the assembly rotates in a permanent-magnet field when the poles are energized. The mercury then contacts the electrodes in succession, giving a pulsating current. Ohio Tool Co. developed it. —ELECTRONICS



POWER IN CONVENIENT PACKAGE—Built around a Ranger V-770-8 engine, the power unit developed by Fairchild for a light-weight, low-power Navy scout plane can be installed or removed in 30 min., and approximately 70% of all line maintenance can be done through the hinged cowl panels. All lines passing through the firewall have quick-couplings; controls and instrument lines are grouped on firewall according to function; entire unit is fastened to aircraft on 4 bolts; oil system is integral with power unit. —AVIATION NEWS

New Building Block—Composed of 6 parts rice hulls and 4 parts rice ash, held together by common cement, a new type of 5x18x12-in. building block has been patented by a Texas inventor. Flame-proof, termite-proof, the blocks can be sawed and will hold nails and screws securely. Enough for a 5-room house cost $1,000. —ENGRG. NEWS-RECORD

Assist for Lift Trucks—Equipped with 2 double-acting hydraulic cylinders, a Towmotor Corp. lift-truck pulls heavy loads onto forks, pushes them off.—AMERICAN MACHINIST

Pneumatic Peening—Delivering 5,000 blows a minute, a 7-in. hammer of Aro Equipment Corp. removes scale and rust from welded parts, sand from small castings, and does not distort light sheet metal. Piston and cylinder are precision-ground alloy steel. Hammer head is 2½-in. long.—MILL SUPPLIES

Permeometer—Air permeability of fabrics up to 5/16 in. thick which will pass 1 to 400 cfm. air per sq. ft. (pressure drop, 0.5 in., water) is measured in less than 15 sec. by a 15-lb., 115-volt ac.-dc. device announced by W. & L. E. Gurley. —TEXTILE WORLD

Midget Germicidal Lamp—About the size of an automobile headlamp bulb, a new sterilamp developed by Westinghouse Electric Corp. for domestic refrigerators replaces an 8-in. tubular lamp, operates for 5¢ a month. A tungsten filament glows for 3 sec. to start the mercury-vapor arc which produces germ-killing ultraviolet. —BUSINESS WEEK

Light Air Capacitors—Two sets of concentric aluminum cylinders that are moved apart by a screw form the new ½-in. dia., 3- to 30-mmf. capacitors of North American Philips Co., Inc. They are light enough to mount on connecting leads. —ELECTRONICS

Shrink-fit Plastic Protector—Parts up to 21-in. diameter can be covered for protection, insulation, or appearance by special plastic sleeves and caps which are expanded by 2- to 4-hr. immersion in a dilator solution and shrink to a tight fit after they are in place. Developed by General Electric Co., the material is tough, durable, resilient, and resistant to water, acid, alkali, has good electrical properties, can be cut.—AMERICAN MACHINIST

Excess-flow Check Valve — Danger from wildly whipping compressed air hoses is eliminated by Hackett Mfg. Co.'s new safety check valve which shuts off the air in event of excessive flow caused by accidental disconnection or rupture in the air line. The valve consists of a threaded housing and a steel ball, is attached between compressor and air line. —POWER

Trout Paste—Each 3¾-oz. can of a new smooth-spreading sandwich paste of High Valley Farm contains—besides butter, eggs, milk, flour, salt and spices—one rainbow trout that weighed ⅛ lb. before dressing, smoking, and processing. —FOOD INDUSTRIES

Saws Masonry on Spot—Tile, brick, and concrete block are cut to fit on the job by a 2-hp. portable, dustless masonry saw developed by Champion Mfg. Co. A water-circulating system sprays a fine mist over the cutting surface, preventing dust while cooling the circular blade. Operator fatigue is reduced by a hand-pushed feed conveyor cart. A spring oscillator on the blade mounting alternately applies and relaxes cutting pressure. —BUSINESS WEEK

FREE SERVICE TO READERS

As a special service to our readers, The McGraw-Hill Digest will furnish, without charge, additional information about any new product or technical development described in the publication. Inquiries are welcomed. Address your letter to: The Editor, The McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A. —*THE EDITORS*

Pitfalls of Profit Sharing

This high-sounding industrial relations scheme has many liabilities, as well as assets. Failures outnumber successes

Profit sharing can be a snare and a delusion unless used under exactly the right conditions. It is no substitute for good industrial relations, payment of adequate wages, a good pension program. Nor does it provide insurance against unionization of employees. If employer-employee relations are not satisfactory, profit sharing may give rise to more problems than management had to deal with previously.

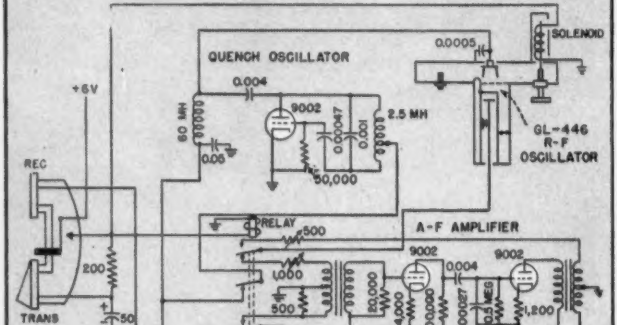
Employees are likely to take for granted the annual payment of a profit-sharing bonus after they have had it once or twice. Then if profits shrink or disappear, the workers often are dissatisfied because their standard of living is affected. The plan often proves to be a poor incentive to workers. They feel that extra efforts are offset when other employees do not work as hard as they do, time between annual payments is long, other factors such as inventory losses may lower profits even if employees do work harder.

Companies should not attempt to set up a profit-sharing scheme unless profits are fairly large in relation to number of employees, since the payment of small amounts will not cause much enthusiasm.

Experience of Pension Planning Co. indicates that at least 75% of recently established profit-sharing plans do not solve employers' postwar problems and should be changed to pension plans, which generally are more effective.

Profit sharing has been abandoned by 60% of the 161 firms surveyed by National Industrial Conference Board. More than 25% were dropped as the result of employer or employee dissatisfaction, some 36% because there were no profits to share or the company had gone out of business or changed hands. Dissatisfaction rose mostly from employees' lack of understanding of the principles involved and their inability to comprehend the influence of the business cycle on profits.

Of representative 12 plans studied by



30-MILE RADIO PHONE—This 56-lb., narrow-beam, 2,700-mc. telephone furnishes reliable and difficult-to-intercept communication between 2 sets 30 miles or more apart. The antenna uses a 30-in. aluminum paraboloid, the radiator being a half-wave dipole and a parasitic reflector. For receiving, the oscillator lighthouse tube is used as a superregenerative detector with a separate quench oscillator and a 2-stage audio amplifier. When the "talk" button is pushed, a dielectric plunger is pulled into the oscillator cavity by a solenoid, bringing it to preset frequency. —ELECTRONICS

FIRST TWIN 'COPTER IN AIR — The 10-passenger XHJD-1 built for Navy by McDonnell Aircraft is first twin-engine (450 hp. each) helicopter to be flown. It cruises 100+ mph., carries 3,000+ lb. of useful load. The 40-ft. counter-rotating rotors are supported by pylons with engine nacelles midway. Through overrunning clutches, either engine will drive both rotors. —AVIATION NEWS

Consolidated Management Consultants, 3 were successful, 7 unsuccessful, 2 doubtful. Chief benefit from the 3 successful plans was a 42% decrease in labor turnover. Absenteeism, however, was practically unaffected. Productivity and quality of work were not changed. Two of the plans were installed to control turnover and the third as a philanthropic gesture. All awarded dividends on shares of stock for each period of service with the company. In all three companies, equitable base rates and sound labor relations were in force before, as well as after, the plan took effect. —AMERICAN MACHINIST

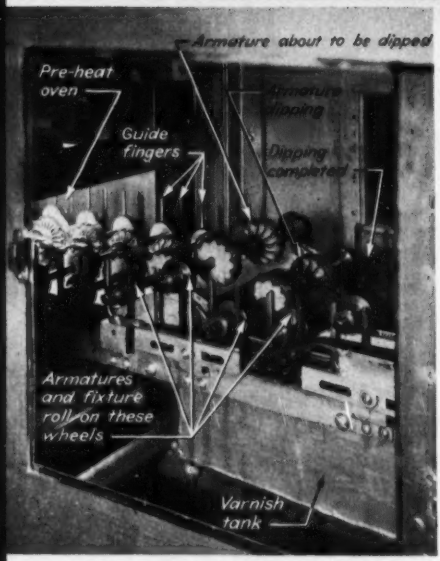
LINEAR ELECTRIC MOTOR CATAPULTS PLANES

Essentially an electric motor which delivers power in a straight line rather than in a rotating pattern, the new Westinghouse Electropult consists of a track (corresponding to a rotor) installed in the runway and a shuttle car with the coils and iron cores normally found in a motor stator. To obtain the 12,000-kw. power surge required to launch a plane, the Electropult utilizes an ac. generator equipped with a 24-ton flywheel. This generator and flywheel are brought to 1,300 rpm. by a dc. motor powered by a generator driven by a 1,100-hp. aircraft engine. The mechanism launched a jet fighter at 116 mph. in 4.1 sec., after a 340-ft. run. Without assistance, the run would have been 2,000 ft. Application to commercial aircraft is seen feasible. —BUSINESS WEEK

FLASH WELDING PAYS WAY, IS VERSATILE

Reduced internal diameter at the threaded end of an hydraulic piston requires a difficult boring operation if piston is of one-piece construction. Making it of 2 parts joined by flash butt welding simplifies machining enough to more than compensate for welding . . . Automobile valve heads of special alloy can be flash welded to shanks of inexpensive material to cut costs . . . A landing-gear bellcrank would be impracticable to make from one piece. Other welding methods fail to give required strength without considerable increase in weight, but the part can be formed successfully by flash welding 2 forgings and a piece of tubing into 1 piece, saving machining time, weight.

Flash welding (by electric resistance) is a versatile process often justified on limited quantities by savings in materials, machinery. —AMERICAN MACHINIST



ROLLS ARMATURES THROUGH VARNISH—Insulating varnish is applied to motor armatures with the new Zander-roll machine in 10 to 50% of the time required by conventional methods. Varnish distribution is so uniform that balancing can precede treating. Reliability and thoroughness of the application have reduced rejects. Extensions are slipped over each end of the armature shaft, these having at the outer ends knurled-rim disks which roll along 2 parallel conveyor tracks and rotate the armature as it passes through preheat, first dip, first bake, second dip and second bake in a closed tunnel. Motion along the track and spacing between units are governed by vertical fingers on the conveyor chains operating alongside the tracks. Parts not requiring insulation stay clear of the varnish. Wastage is small, since there is no drainage. Production is about 200 an hour. —PRODUCT ENGRG.

AIRCRAFT TESTED IN PRESSURE CHAMBER

North American Aviation is making functional tests of entire fighter fuselages and large bomber and transport sections in a 75-ton refrigerated altitude chamber, 53-ft. long, 17-ft. in dia. Temperature range is 185 to —96° F., and humidity can be controlled to give desert aridity or fog, rain, sleet, or snow. Air densities at sea level and up to 60,000 ft. can be simulated. Test cost is put at $50 an hr. for a fighter plane, compared to a cost of $500-$1,000 for flight tests. —AVIATION NEWS

NEW PROCESS PRODUCES LEVULOSE AT LESS COST

Now in the pilot-plant stage, a new process for the commercial production of levulose (fructose or fruit sugar) promises a product inexpensive enough to be used in ice cream, jellies, baked goods, candies, and soft drinks. Levulose not only is sweeter than sucrose (ordinary sugar), but it dissolves more readily and is more stable in acid solution.

The process involves breaking down the sucrose molecule into levulose and dextrose by adding dilute acid to produce invert sugar. Then milk of lime is added to produce a lime-levulose solid, which is filtered from the dextrose syrup and suspended in water. Carbon dioxide is bubbled through and combines with the lime to form calcium carbonate, leaving thin levulose syrup. An ion exchanger removes inorganic residues, then the syrup is thickened by evaporation, and agitated until crystals form. The process was announced by the University of Colorado and Sugar Research Foundation. —BUSINESS WEEK

USEFUL TEXTILE CHEMICALS

In liquid form, sodium salt of an alkyl naphthalene sulphonic acid is a wetting-out agent particularly useful in acid conditions in wool processing. Dexter Chemical Corp. recommends it for carbonizing, dyeing, fulling, and bleaching. A new protective agent and dyeing oil for wool, called Maxiton No. 10, assists in penetration and protects the fiber in dyeing, bleaching, drying and after use. A highly sulphated oil, Maxitol forms a stable compound with the basic groups of wool substances. Another wool-treating chemical, a smooth paste of synthetic detergents of the sulphated amide condensation type, is an excellent scouring, emulsifying, dye dispersing and wetting-out agent. It does not hydrolize or turn rancid, and is claimed to be stable enough to be used in solutions of peroxide or bichromate. —CHEMICAL ENGRG.

Fast Fire Control

Factory has steam flame-smothering system and exact routine for workers and fire squad. Special devices used to prevent fires

Fire control keyed to split-second action has been developed in the nitrocellulose-lacquer factory of Glidden Co., where most of the solvents used have flashpoints blow 100° F. and some as low as zero.

Extinguishing Techniques — Although 11 wall-type fire extinguishers are available, they are used only for small fires which can be brought under control without danger to workers. Principal protection are a portable tank extinguisher and a steam fire-smothering system. Pipe lines (2-in.) deliver steam to the 3 floors, each line having openings at either end of the floor. Water hoses are not employed to put out fires but are turned on material exposed to fire to keep it cooled below ignition point.

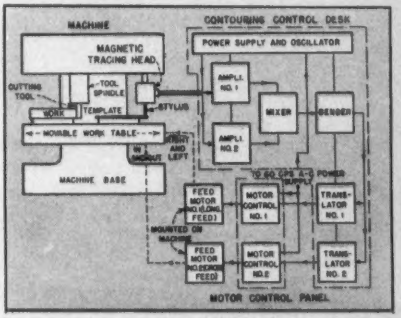
Firefighting Squad—Employees chosen for their level-headedness and experience in handling highly inflammable materials have been organized into a skilled 21-man firefighting team. Fire drills are held twice monthly, without previous warning. Under direction of a captain, the men take charge of various assigned stations. Men not previously assigned a duty help clear inflammable material away from the shipping door. Then all men report to front of building for a quick roll call, after which fire squad members go to their positions.

In the event of fire, the building is flooded with steam until no evidence of fire remains; any fire should be smothered in 5 to 10 min. The windows and doors can be opened, and in 15 min. enough oxygen will have entered the building to permit workmen to return.

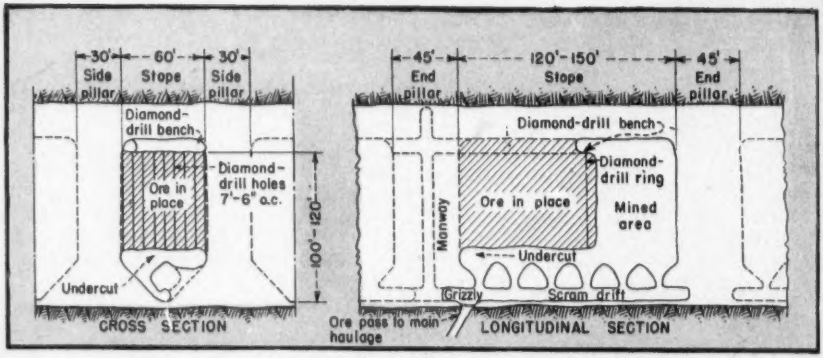
To Avoid Sparks—All lights in the factory have flashproof glass inclosures. All tools are brass or other nonsparking material. An electrical ground lead is connected to conductors in conduits running the length of the building on both sides of all floors, and there are plug-in connections every 10 ft. Stationary equipment is connected by permanent leads. A special ground lead with plugs on one end and a clip on the other must be attached to each kettle or drum before any liquid is poured out or funneled in, thus preventing flashbacks caused by accumulated static electricity.

Two master electric power switches are installed for safety, one on outside wall, the other in the power house.

Only windows not permanently closed are on 3rd floor. A gear arrangement controlled from outside the building operates these. They cannot be adjusted from the inside. —FACTORY



MACHINES CURVES—Following a templet, movement of a stylus in a magnetic tracing head varies 4 inductances in 2 bridge circuits to vary output voltages which are amplified and mixed to give a vector signal indicative of direction and distance of stylus movement. The phase of the signal is then shifted in a bender by an amount proportional to its magnitude, or, in turn, the magnitude of stylus deflection. It then has directional characteristics which cause correct movement of stylus along edge of templet. Now this 2,000-cycle ac. voltage is applied to the grids of translator tubes and a 2,000-cycle reference voltage to the plates. The translator circuits give the dc. voltages with a magnitude proportional to the required speed and a polarity which determines direction of feed motors. Tests at tool travel speeds of 5 to 10 in. a min. showed errors of approximately 0 002. and 0.003 in., respectively. —ELECTRONICS



DIAMOND DRILLING IMPROVED—In a pyrite stope in California, this method of blast-hole diamond drilling was adopted to control breakage and reduce damage done by conventional large powder shots. In a nearby orebody, a scram shaft was driven each way from a central incline shaft, followed by full-length undercutting, and opening of narrow vertical stope at each end to serve as a slot towards which blast holes could be broken. Holes were diamond-drilled in ring pattern from a central adit near back of orebody, and 85% of the calculated ore was extracted before the final cave-in. A 30,000-ton transverse pillar sustained main haulage system. —ENGRG. & MINING JOURNAL

ELECTRONIC INDICATOR TELLS WHERE TRAINS ARE

Now being installed by the Chicago, Rock Island & Pacific Railway Co., an electronic train position indicator will operate over any existing communications facilities — telephone, telegraph-carrier wires, or radio channels—to present both temporary and permanent records to the train-central man 5 to 500 miles away. It is not affected by static, the signal can be held until dispatcher acknowledges it, and the system is highly sensitive, fast, and uses positive-acting relay circuits.

A small radio-frequency oscillator is placed at a remote point, being tuned to a frequency thereafter identified with that point. When a train passes, a keying unit places the oscillator in operation. This signal goes through an isolation unit and is then carried over wayside wires to the control or dispatcher's office, where it passes through another isolation unit and a selective filter system. It is amplified and applied to a tube which limits the amplitude of signals and static. Then it is rectified and the resulting triggering voltage is fed through a time-delay circuit to a thyratron circuit controlling a relay which operates a signal light and a pen recorder.

When the train moves on, the signal stops and a relay operates another signal light. —ELECTRONICS

TRANSPORTATION DESIGNS

To handle 6 streams of passengers (3 boarding and 3 alighting) during high peak loads in Chicago, a 2-man, single-way, rear-entrance street car has been designed with double doors at each end, single door at center. Long skirt wheel protection is another feature of the 55-passenger cars.

Trolley buses with body construction of aluminum alloy and corrosion resistant steel with box-girder-truss body sides are planned by Marmon-Herrington.

Accommodating 15 prams and 7 pushers, with mother and children, a special bus in Geelong, Australia, has passenger seats running lengthwise 12 in. from sides of bus so children can look out of windows and prams can be parked in aisle. —BUS TRANSPORTATION

RADAR FORECASTS WEATHER

Measurements of winds aloft by theodolite tracking of free balloons is not feasible in cloudy weather, but recently developed radio direction-finding and position-finding (radar) techniques work in nearly any kind of weather—with greater accuracy. The relatively simple, light, and inexpensive SCR-658 radio-direction-finding receiver is standard in the Air Weather Service. It contains no transmitter, is not enclosed in a van, and does not track automatically. The ground equipment measures azimuth and elevation angle, and the transmitter signals its height by means of a baroswitch. The transmitter now is combined with radiosonde elements which signal air temperature and humidity on the flight.

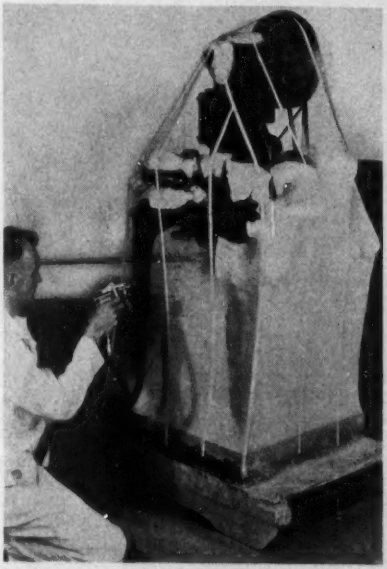
While radar wind-finding has found ready acceptance among meteorologists, such is not the case with radar storm detection. However, seven APQ-13 radars have been in regular storm-detection service for a year, have contributed to air safety, and 38 more will be installed by the Air Weather Service by the end of this year. Storm observations probably will be available for civilian use.

Microwave radar locates precipitation with great accuracy and resolution. Thunderstorm behavior can be forecast for 15 min. to several hours, permitting airmen to avoid the storms. Many other groups soon will benefit by accurate short-range shower, lightning, hail, windstorm, and hurricane warnings based upon radar observations. —ELECTRONICS

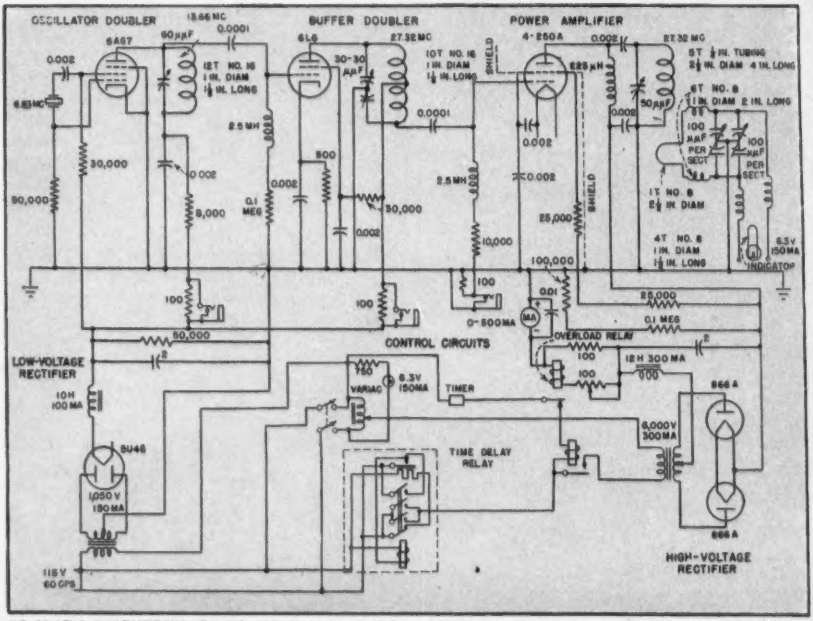
ONE REASON WHY SHIPS BREAK IN TWO

Investigation has revealed that the steel used in the war-time-built welded merchant ships which broke in half met standard specifications for elastic modulus, yield and ultimate strength, and elongation. While the final conclusions as to the reason for the failure have not been reached, tests indicate that the ductility of steel may decrease markedly at low temperature, so that cracks, once started, propagate under tension with such speed as to produce a loud report like an explosion. Test data indicate that the transition from high to low ductility is abrupt, and data obtained at one or two convenient temperatures cannot safely be extrapolated to lower temperatures. If impact tests are to be conducted at only one temperature, the only safe temperature is one below the lowest working temperature of the metal.

It is recommended that acceptance specifications for materials to be used under tensile loading require impact or other suitable tests to insure adequate ductility at the working temperature of the structure. —PRODUCT ENGRG.



SPRAY PACKAGING—Modified film-forming vinyl resins carried in volatile solvents are now available from R. M. Hollingshead Corp. for packaging parts, assemblies or complete machines. Initial spray application bridges large openings with weblike filaments; subsequent spraying produces a tough, durable, flexible, moisture-impervious covering. —CHEMICAL ENGRG.



NO-STATIC DIATHERMY—Crystal control can be applied to industrial and medical radio-frequency heating equipment to narrow the frequency band and avoid radio interference. The schematic circuit diagram above is for a 3-stage r-f heater (filament power supplies have been omitted, power supply at left serves oscillator and buffer stages). Designed for medical diathermy, the basic circuit can be modified for industrial heating application. —ELECTRONICS

NEW BUS EQUIPMENT

Twin-Coach is installing a wide-angle, horizontally divided windshield which, with curved steering post placing driver closer to front of bus, gives maximum close-range upward and downward vision . . . In new Mack buses air is drawn in (30 cfm. per passenger) by 2 axial-flow blowers, delivered to one perforated set of ducts over and behind the card racks, and to a heater in series with radiator in powerplant compartment. Distribution of heated air is effected by underfloor ducts and through hollow seat pedestals . . . Hunter is producing a 22-lb., 21x6-in. gasoline-burning bus heater which, remotely and thermostatically controlled, is rated 25,000 btu. per hr . . . A combustion-type heater with blower attachment, produced by Stewart-Warner, has a rated output of 20,000 btu. per hr. Operation is automatic, and independent of engine cooling system, exhaust system, carburetor and manifold . . . Made from Geon polyvinyl chloride resins by Masland Duraleather Co., new colored upholstery is washable, impervious to sunlight, acids, oils, and alkalies. —BUS TRANSPORTATION

All Rights Reserved

Items appearing in the McGraw-Hill Digest may not be reproduced, in full or in part, without written permission of the publishers. Contents copyrighted, 1946, by the McGraw-Hill Publishing Co., Inc.

Timely McGraw-Hill Books

PRINCIPLES OF TOOL ENGINEERING

By RAYMOND R. BLOOM, Assistant Professor of Industrial Engineering, The Pennsylvania State College. 234 *pages*, $2.40.

A simple, understandable text offering an introduction to tool engineering and covering the important principles of this subject. Outstanding features include material dealing with the tool engineering department and the tool engineer's training and duties, and a correlated list of visual aids.

AERODYNAMICS

By A. W. SHERWOOD, David Taylor Model Basin. 265 *pages*, $2.75.

Covers the most practical aspects of both theory and experiment in the field of aerodynamics. Unusual emphasis has been placed upon the physical phase of the theory in order to hold the student's interest and to provide a general background suitable for more intensive mathematical work in the subject.

THE CHEMISTRY OF HETEROCYCLIC COMPOUNDS

By AVERY A. MORTON, Professor of Organic Chemistry, M. I. T. *International Chemical Series.* 549 *pages*, $6.00

Covers the methods of formation of the various hetero rings, the chemical behavior of each system with particular reference to the similarity which that system bears to aliphatic and aromatic chemistry, and the compounds of major importance which have made heterocyclic chemistry so interesting.

ELECTRICAL TRANSMISSION IN STEADY STATE

By PAUL J. SELGIN, Research Engineer, Farnsworth Television and Radio Corporation. *McGraw-Hill Radio Communication Series.* 427 *pages*, $5.00.

Here is a comprehensive coverage of the methods of network theory for the practicing engineer and advanced student in the communications field. It presents a full treatment of impedance transformation and transfer of power through lines and networks, particularly in the ultrahigh frequency range.

FINISHING METAL PRODUCTS, *New second edition*

By HERBERT R. SIMONDS, Consulting Engineer, and ADOLPH BREGMAN, Consulting Engineer. 352 *pages*, $4.00

A treatment of the finishing of metal products from a broad point of view, pointing the way both to more attractive metal finishes and to more efficient means of producing them. In all, this second edition brings the entire subject up to date, and adds much important new material on coloring metal, costs and estimates, and on organic coatings.

PLASTICS HANDBOOK FOR PRODUCT ENGINEERS

By JOHN SASSO, Managing Editor, *Product Engineering.* $6.00

Presents in concise handbook form, practical and fundamental data of specific use to the engineer planning to employ these new materials in new product designs. Includes a section on chemistry of plastics and synthetic rubber, and comprehensive tables on properties and selection of a plastic material for given applications.

AIRPORTS: DESIGN, CONSTRUCTION AND MANAGEMENT

By HORACE K. GLIDDEN, Eastern Editor of *Roads and Streets* Magazine, HERVEY F. LAW, Manager of Washington National Airport, and JOHN E. COWLES, Chief, Airport Design Unit, First Region, Civil Aeronautics Administration. 696 *pages*, $7.00

Here is a book covering all aspects of airport design, construction, and management, to give the reader a sound, accurate knowledge of each of the component parts of an airport, the requirements and factors involved in its location and design, and the basic principles underlying its functional operation and management.

McGRAW-HILL BOOK COMPANY, INC.

330 WEST 42nd STREET • NEW YORK 18, N.Y., U.S.A.

VOLUME 1 • NUMBER 7
NOVEMBER

F. K. LAWLER, *Editor*

R. W. DORMAN, *Assistant Editor*

SHELBY McMILLION, *Business Manager*

FREDERIC C. THIEME, *Advertising Manager*

The McGraw-Hill Digest is published monthly by the McGraw-Hill Publishing Co., Inc., for circulation in all countries except the United States and Canada. Editorial and executive offices, 330 W. 42d St., New York 18, N. Y., U.S.A. James H. McGraw, Jr., President; Curtis W. McGraw, Senior Vice-President and Treasurer; Eugene Duffield, Editorial Assistant to the President; Joseph A. Gerardi, Secretary. Address correspondence regarding subscriptions to J. E. Blackburn, Jr., Director of Circulation. *Subscriptions also may be ordered through local book dealer or McGraw-Hill's London Office, Aldwych House, London, W. C. 2.* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy, 50¢ (U. S. currency or equivalent).

McGRAW-HILL DIGEST Subscribers Enjoy These Reader Privileges...

IN EACH issue of the McGRAW-HILL DIGEST there appears a small announcement inviting inquiries from readers who desire additional facts about any of the items in the issue, and you may want to know a little more about the services offered.

WHENEVER you, as a subscriber, are especially interested in an article in the McGRAW-HILL DIGEST, upon request we will furnish tear sheets of the original article as long as they are available, and at no cost to you.

SHOULD you be interested in having additional information about any of the equipment described in the New Products section, your inquiry will be acknowledged, and a copy of your letter will be sent to the manufacturer with the request that complete descriptive literature be sent to you.

ANY questions not answerable in accordance with the methods outlined above are given special attention by McGRAW-HILL DIGEST editors, who will consult with the editors of the various McGraw-Hill Publications, and with other authorities, whenever necessary in order to give you the information you want.

WE BELIEVE you will agree that these services, coupled with our tremendous news-gathering facilities, should make the McGRAW-HILL DIGEST one of your most valuable sources of technical and business information.

HOW to Subscribe to the McGRAW-HILL DIGEST

IF YOU are not already a subscriber to the McGraw-Hill DIGEST you will be interested to know that you can now send your subscription orders and payments to the McGraw-Hill Publishing Co., 330 West 42nd Street, New York 18, N. Y., U. S. A. – to the McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London WC2, England – or to your local bookstore – whichever is more convenient.

COPYRIGHT, 1946, BY THE McGRAW-HILL PUBLISHING COMPANY, INC. PUBLISHERS OF AMERICAN MACHINIST • AIR TRANSPORT • AVIATION • AVIATION NEWS • BUS TRANSPORTATION • BUSINESS WEEK • CHEMICAL ENGINEERING • COAL AGE • CONSTRUCTION METHODS • ELECTRICAL CONTRACTING • ELECTRICAL MERCHANDISING • ELECTRICAL WEST • ELECTRICAL WHOLESALING • ELECTRICAL WORLD • ELECTRONICS • ENGINEERING & MINING JOURNAL • E & M J METAL & MINERAL MARKETS • ENGINEERING NEWS-RECORD • FACTORY MANAGEMENT & MAINTENANCE • FOOD INDUSTRIES • THE McGRAW-HILL DIGEST • MILL SUPPLIES • POWER • PRODUCT ENGINEERING • SCIENCE ILLUSTRATED • TEXTILE WORLD • THE WELDING ENGINEER

Reproduced from the Science Illustrated article, "Silent Death"

A NEW WAY TO KEEP WELL-INFORMED ON SCIENCE AND ITS APPLICATIONS

You are invited to subscribe to *Science Illustrated*.

This new monthly magazine brings you authoritative news of every branch of Science: discoveries – inventions – engineering accomplishments–new fields of industry–new products–contributions to better living. Articles are clearly written in non-technical language and supplemented by photographs and other illustrations, many in full color.

Science Illustrated is sponsored by the McGraw-Hill Publishing Co., Inc., world's largest publishers of technical and industrial information. This is assurance that you will receive *all* the news of Science–presented interestingly and completely, and analyzed in terms of practical importance from engineering, commercial, educational, health and recreational standpoints.

The subscription rate in Latin-America is $5 per year; elsewhere $10 per year (except U.S. and Canada). Payable in U.S. currency or equivalent. Remit through your local book dealer or subscription agency or to either of the addresses given below.

Science
ILLUSTRATED

McGraw-Hill Publishing Co., Inc. • 330 West 42nd Street • New York 18, N. Y., U. S. A.
McGraw-Hill Publishing Co., Ltd. • Aldwych House, Aldwych, London, W.C.2, England

No Bottom to this Barrel!

In just five years, 200 priceless new processing products have come out of crude oil — all of them developed by Socony-Vacuum and now at work in 30 basic industries!

No matter what you produce — textiles, cosmetics, paper, rubber, frozen foods or anything else — Socony-Vacuum can help you improve your processing, lower production costs.

And no matter what type equipment you use, Socony-Vacuum can help you lower maintenance and lubrication costs.

Our 80 years of experience, our huge refining facilities, top-quality products, world-wide system of distribution and technical service combine to make Socony-Vacuum a *world leader in petroleum.*

GARGOYLE Lubricants

Socony-Vacuum Oil Company, Inc.